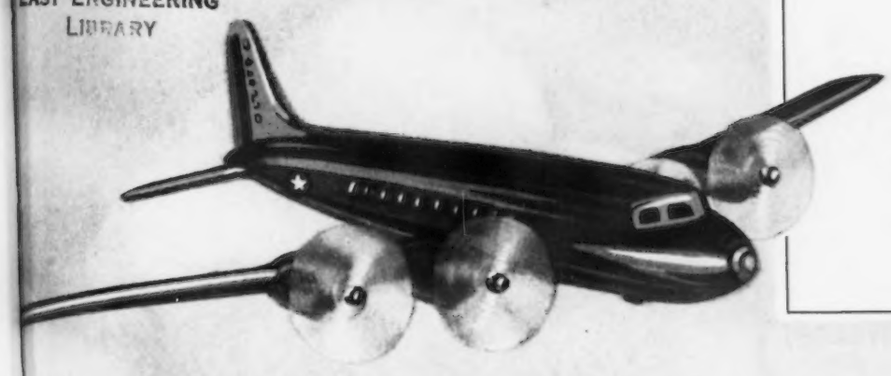
Editorial Index, Page 31

THE IRON AGE

JANUARY 24 1946



Around the World

Known and Accepted by STEEL MEN Around the World

As TODAY's high speed airplanes represent the best in modern transportation, so, in every quarter of the globe where fine steel is made in quantity, Wean Equipment represents the best in Sheet, Strip, and Tin Mill Machinery.

These designers know that in today's competitive market, dependability, economy of operation, a minimum of waste, high speed and high quality output are factors steel men consider first in steel mill equipment.

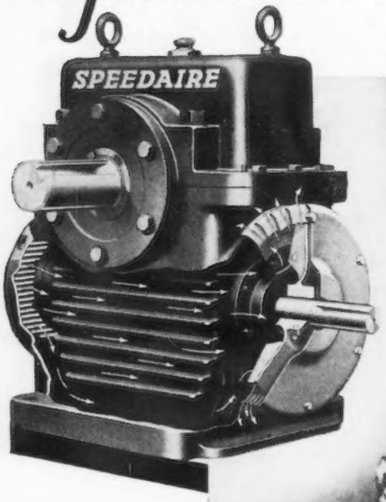
The WEAN

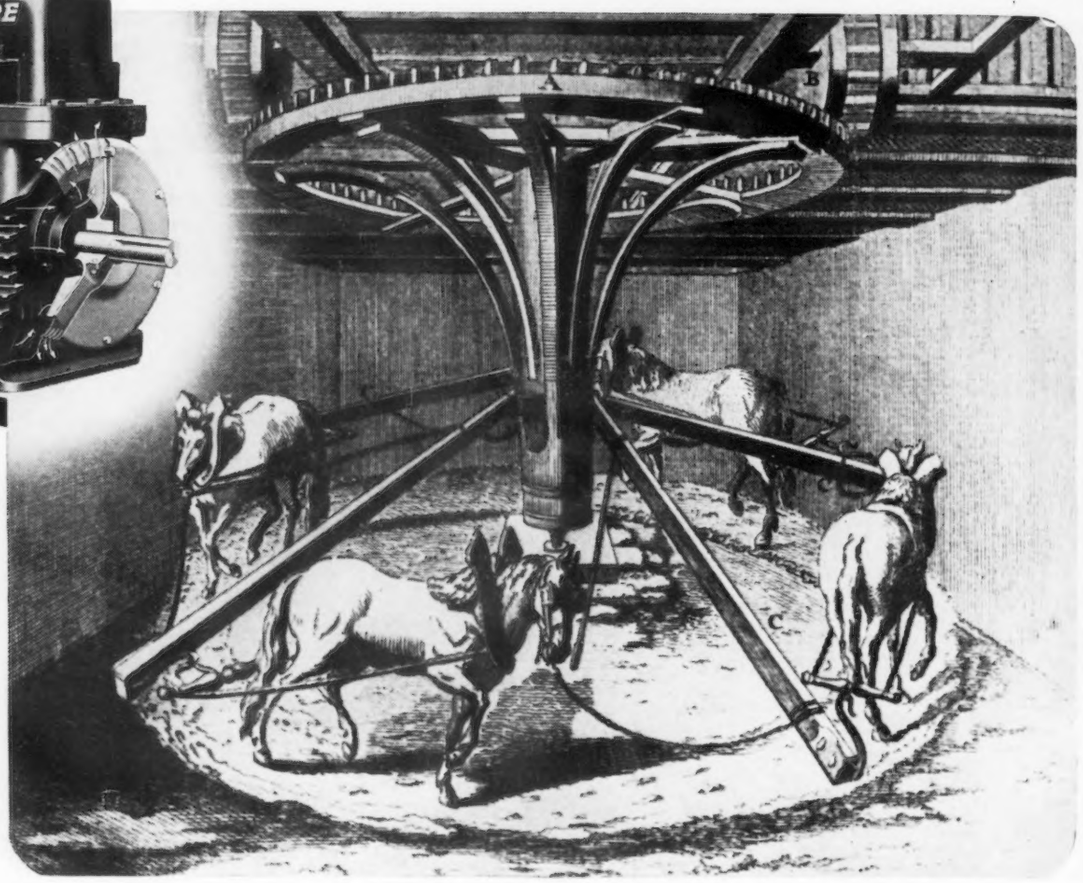
ENGINEERING COMPANY, Inc. • WARREN, OHIO

Subsidiary Company
THE BRODEN CONSTRUCTION CO., CLEVELAND, OHIO

SPECIALISTS IN SHEET, TIN and STRIP MILL EQUIPMENT

200 Years of Power Transmission Refinement .. and Now SPEEDAIRE





Scene in a French "manufactory" around 1750. From an old engraving.

Easy with that smile—*this* "machine drive" was quite up-to-date around A. D. 1750. Think of the amazing progress that has brought you the new Speedaire Fan-Cooled Worm Gear Reducers of 1946—giving you *More Horsepower for your Dollar!*

The new Speedaire sets new standards of worm gear performance—provides applications of economical right-angle drives *to more of your machines.* Investigate Speedaire. Send today for Catalog 300—complete with charts, rating tables and dimension data.

The Cleveland Worm & Gear Company, 3252 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication
In Canada: PEACOCK BROTHERS LIMITED

"More Horsepower for Your Dollar" When You Install Speedaire—Cleveland's New Fan-Cooled Unit

- The Induction Fan continually removes heat by means of a high-velocity air stream scouring the surfaces of the oil reservoir.
- Because Speedaire is Fan-Cooled, it will do more work—and deliver up to *double the horsepower* of standard worm units of equal frame size, at usual motor speeds.
- Speedaire can be installed economically on many applications where other types have been used heretofore—giving you the advantages of a compact right-angle Drive.
- Speedaire is furnished in 6 standard sizes—from 3 to 95 H.P.

Cleveland SPEEDAIRE Worm Gear Reduction Units
FAN COOLED

THE IRON AGE, published every Thursday by the CHILTON CO. (INC.). Entered as second class matter November 8, 1932, at the Post Office at Philadelphia under act of March 3, 1879. $8 yearly in North America and South America, Foreign $15. Vol. 157, No. 4.

J. H. VAN DEVENTER
President and Editorial Director
C. S. BAUR
Vice-President & General Manager
H. E. LEONARD
Assistant General Manager
B. H. HAYES
Advertising Manager
O. L. JOHNSON, Manager
Reader Service and Market Research
R. E. BAUR, Production Manager
R. E. CLEARY C. E. ELLIS
Promotion and Research

o o o

Executive Offices
Chestnut and 56th Sts.
Philadelphia 39, Pa., U.S.A.
Editorial and Advertising Offices
100 East 42nd St., New York 17, N.Y., U.S.A.

o o o

Regional Business Managers
C. H. OBER, New York 17, 100 East 42nd St.
H. E. LEONARD, New York 17, 100 East 42nd St.
ROBERT F. BLAIR, Cleveland 14, 1016 Guardian Bldg.
R. M. GIBBS, Pittsburgh 22, 814 Park Bldg.
B. L. HERMAN, Philadelphia 39, Chilton Bldg.
H. K. HOTTENSTEIN, Chicago 3, 1134 Otis Bldg.
PEIRCE LEWIS, Detroit 2, 7310 Woodward Ave.
D. C. WARREN, Hartford 1, Conn., P. O. Box 81
R. RAYMOND KAY, Los Angeles 28, 2420 Cheremoya Ave.

o o o

Owned and Published by
CHILTON COMPANY
(Incorporated)

OFFICERS AND DIRECTORS
JOS. S. HILDRETH, *President*
GEORGE H. GRIFFITHS Vice-President
EVERIT B. TERHUNE Vice-President
J. H. VAN DEVENTER Vice-President
C. S. BAUR Vice-President
P. M. FAHRENDORF Vice-President
JULIAN CHASE Vice-President
WILLIAM A. BARBER, Treasurer
JOHN BLAIR MOFFETT, Secretary
G. C. BUZBY HARRY V. DUFFY
THOMAS L. KANE CHARLES J. HEALE

o o o

WILLIAM H. VALLAR, Asst. Treas.

o o o

Chilton Editorial Board
PAUL WOOTON
Washington Representative

o o o

Member, Audit Bureau of Circulation

Member, Associated Business Papers

o o o

Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price North America, South America and U. S. Possessions, $8; Foreign, $15 per year. Single Copy, 35 cents. Annual Review Number $2.00.

o o o

Cable Address, "Ironage" N. Y.

o o o

THIS WEEK IN THE

IRON AGE

Vol. 157, No. 4 January 24, 1946

Editorial

o o o

Technical Articles

o o o

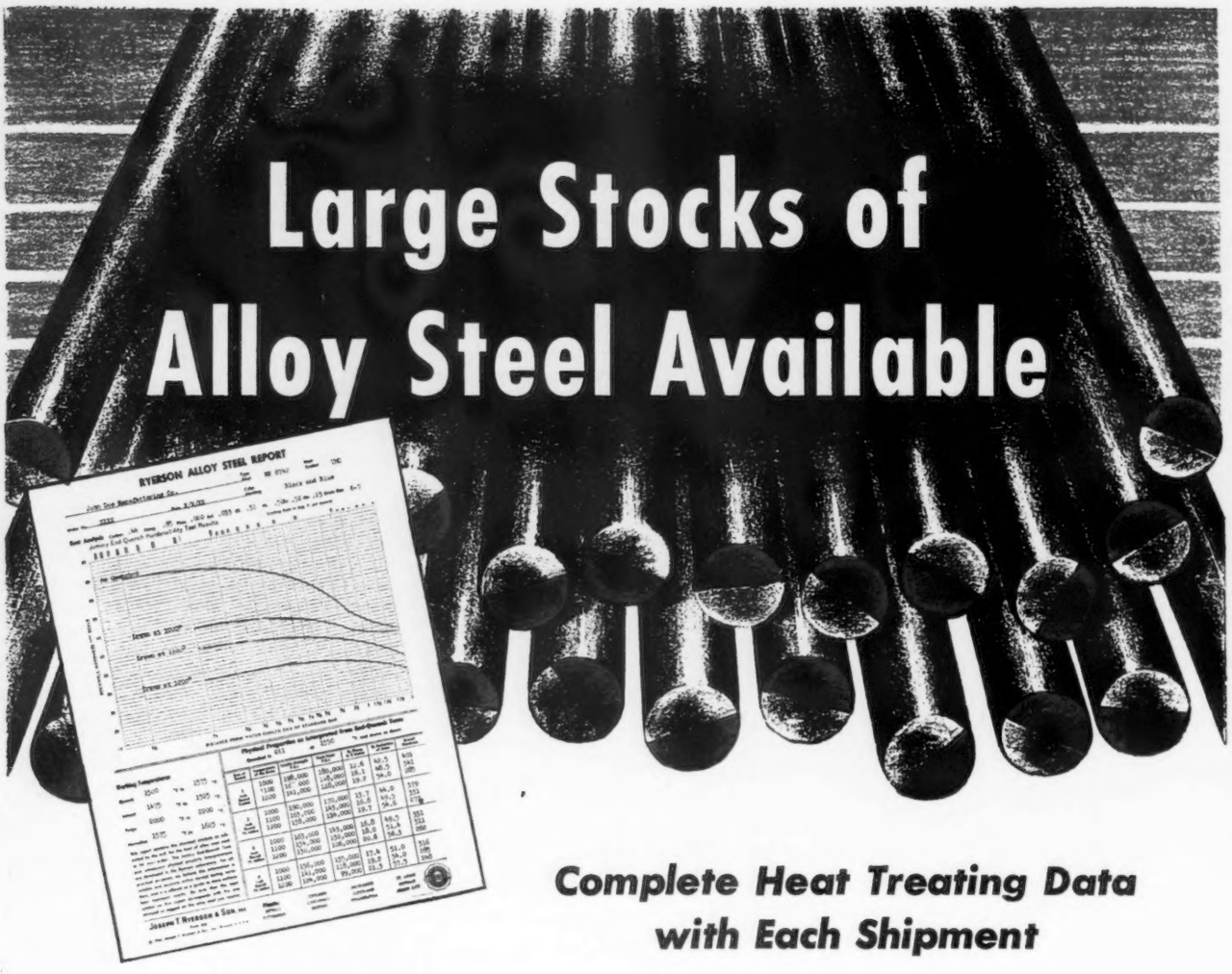
Features

o o o

News and Markets

o o o

Large Stocks of Alloy Steel Available



Complete Heat Treating Data with Each Shipment

You can get quick shipment of alloy steel right now. Ryerson Stocks—the nation's largest—are in excellent shape.

And you can be sure of exact analysis when your alloy steel requirements are obtained from Ryerson. With *each* shipment complete data sheets are supplied. These sheets give analyses and test results for each alloy in the shipment, and furnish a guide for heat treatment.

Ryerson service is dependable. It delivers your alloy shipment to your plant when you want it.

The 1945-46 edition of the Ryerson Stock List and Steel Data Book including information on all steel products, has been distributed, but if for some reason you haven't received a copy, place your request and copy will be sent to you promptly.

JOSEPH T. RYERSON & SON, INC.

Steel Service Plants at: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston

RYERSON STEEL

THE
IRON AGE

ESTABLISHED 1855

o o o

January 24, 1946

o o o

J. H. VAN DEVENTER
President and Editorial Director

C. S. BAUR
Vice-President and General Manager

o o o

Editorial Staff
Editor .....T. W. LIPPERT
News Markets Editor T. C. CAMPBELL
Machine Tool Editor....H. E. LINSLEY

o o o

Associate Editors
W. A. PHAIR
F. J. WINTERS
J. ALBIN
S. H. BARMASEL
E. S. KOPECKI

Editorial Assistants
M. M. SCHIEN
H. W. VAN CAMP
C. R. MUNZER
J. P. O'CONNOR
E. L. SCHIMKO
E. A. TOWNE
A. J. SPEAR
R. E. BENEDETTO

Foreign Editors
Europe .....JACK R. HIGHT
Canada (Contrib.)...F. SANDERSON

Regional News and Technical Editors
T. E. LLOYD
Pittsburgh 22
814 Park Bldg.

C. T. POST
Chicago 3
1134 Otis Bldg.

JOHN ANTHONY
Philadelphia 39
Chilton Bldg.

L. W. MOFFETT
EUGENE HARDY
D. J. ANSBORO
Washington 4
National Press Bldg.

W. A. LLOYD
Cleveland 14
1016 Guardian Bldg.

S. H. BRAMS
Detroit 2
7310 Woodward Ave.

OSGOOD MURDOCK
ROBERT T. REINHARDT
San Francisco 3
1355 Market St.

Editorial Correspondents
ROBERT McINTOSH
Cincinnati

L. C. DEAN
Buffalo

G. FRAZAR
Boston

HUGH SHARP
Milwaukee

R. RAYMOND KAY
Los Angeles

JOHN C. McCUNE
Birmingham

ROY EDMONDS
St. Louis

JAMES DOUGLAS
Seattle

One Thing is Sure

IN these days of print shop congestion, it takes several days and nights to turn out a publication as sizeable as yours and ours. And since we start at the front and work toward the back instead of using the reverse method, this page has to be ready several days in advance. That is a handicap sometimes, as now, for instance, when at this writing the answer to the question "to be or not to be" has not yet been decided.

Of course one way out of this dilemma would be to publish three editorials in this one issue. One of them would be appropriate to a settlement of the steel strike controversy, another based on postponement and still another on a walkout. However, this would be a rather unprecedented procedure and might well leave the reader confused. At any rate, by the time this gets to him, he will know the answer.

I will amend that statement. He will know the answer but he may not know its implications which are perhaps more important.

One thing is sure. No matter which way the cat has jumped, it is in the direction of inflation.

Some people argue that strikes are deflationary pressures, since they reduce buying power through loss of wages and profits. Take the case of the General Motors' employees who have now lost one sixth of a full year's wages. That would seem like a high price for these particular workers to be willing to pay to enable Mr. Reuther to become headline news as America's No. 1 bookworm. For whatever settlement GM may make with UAW, it will take these workers a full year of work on the new scale, just to break even.

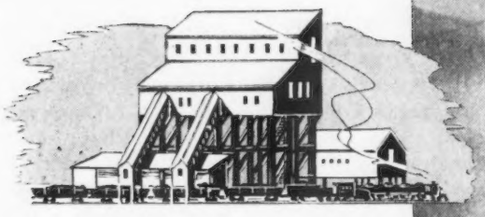
This is what you might call fractional or selective deflation. The GM boys are the guinea pigs in this instance. Perhaps they are undergoing their deflation of savings recompensed by the thought of the benefit it may bring to Ford and Chrysler workers who are still getting their pay envelopes.

Of course an industry wide strike, such as a steel strike would be or would have been, would do a more wholesale business in reducing buying power through loss of wages. But since lack of things to buy is an inflationary factor and since workers in so many occupations are ceasing to make things to be bought, you are right back where you started from which is practically nowhere.

Naturally the interest of Government officials is to get somewhere, preferably back into office via the reelection route, which means that they have to please the most customers. Since so many of these customers, or voters, are pressing for wage increases, the easiest way to accommodaate them is to break the price line, which will undoubtedly happen. Especially since the average man takes the figures on his pay envelope at face value and does not consider the buying power of the dollar.

Of course that will be tough on the people who have bought defense and war bonds with real 1941 or 1942 dollars and have seen their buying power already shrink 25 pct. But it will make it easier to pay off on the national debt, which is a political advantage.

So one thing is sure. Strikes or no strikes, we are not just on the threshold of inflation but a good three feet inside the door.



This 23 yard Inland Hi-Steel bucket, at the right, saved $23,000 the first year.

$23,000 Saved . . . with Inland Hi-Steel

Facts and Figures Prove Advantages of Using Inland Hi-Steel Where Light Weight and High Strength are Needed.

The records maintained at Maumee Collieries show that when Inland Hi-Steel replaced material formerly used these important advantages were gained:

(1) The first cost was 40% lower.

(2) Maintenance was cut in half.

(3) Weights were decreased as much as 32%.

(4) Capacities went up an average of 51.6%.

The cost logic behind the use of Inland Hi-Steel was summed up by a Maumee official when he said, "We estimate that our 23 yard Inland Hi-Steel bucket saves three tenths of a cent a yard over the bucket previously used. In one year this 23 yard bucket moved 7,671,000 cubic yards of overburden at a total saving of $23,000."

Scores of products and processes are utilizing the corrosion-resistant, abrasion-resistant, high-strength and light-weight characteristics of Inland Hi-Steel. Write us if you would like further information.

Principal Products: Bars, Floor Plate, Piling, Plates, Reinforcing Bars, Sheets, Strip, Structurals, Tin Plate, Rails, Track Accessories. INLAND STEEL COMPANY, 38 S. Dearborn St., Chicago 3, Ill. *Sales Offices:* Cincinnati, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

INLAND
Hi-Steel

The IRON AGE
Jan. 22, 1946

NEWSFRONT

► U. S. Steel, still hankering after Geneva, is prepared to bid for the plant. If successful, the corporation expects to encourage auto manufacturers and others to establish a thriving manufacturing center in the vicinity.

► Although aluminum ingot capacity is more than double current peacetime requirements, a shortage of its fabricated products may delay civilian production in some industries. Many war-created facilities are not adapted to peacetime production and many workers have drifted away to other communities.

► The adequacy of copper and brass for civilian production will depend on government price, import and subsidy policies, and the supply of labor available to mines and fabricators.

Lead and antimony will be continued in short supply in 1946. Demand for lead is expected to be 50 pct greater than in prewar years but since available supply will be below prewar levels, not all demands will be met.

► The British £, now valued at $4.03, is judged by British economists actually to be worth something in the neighborhood of $3.60, and action is expected soon to drop it to somewhere near that figure.

► To make service life more attractive, Britain is jacking up pay to correspond roughly with civilian employment. A soldier under the rank of sergeant with a wife and two children will be offered the equivalent of about $21 per week, with special gratituities at the retirement age of 55 yr. Qualifying age for marriage will be 21 yr.

► Large percentages of British homeless families are refusing to live in newly-erected American prefabricated houses and the government has abandoned plans for increasing prefabricated home construction.

The houses are not weathering their first winter very well. Many sections are having to be replaced. Housing committees say that in damp weather the walls sag like blotting paper and "a child could kick a hole in the walls."

► Susceptibility to weld cracking has been attributed by investigators to a combination of high hydrogen content in the steel and high hardness (martensite) resulting from rapid cooling. Investigators have piled up considerable evidence that electrode coatings containing relatively high percentages of combined water and organic matter are the most probable sources of hydrogen in the weld metal.

However, the evidence is not so clear-cut that hydrogen introduced through the electrode affects the base metal. Nevertheless, experience does indicate that cracking tendencies are lowered in some highly hardenable alloy steels by welding with electrodes covered with lime or other inert coating.

► An electronically controlled tracing device eliminates the need for metal and wood templates in steel cutting operations. Intricate shapes are followed with extreme accuracy and the only templates required are simple outline drawings or silhouettes which provide sufficient light contrast.

► Cold working of specimens of 16-25-6, an alloy developed to withstand the high temperatures of gas turbines, from the hot-rolled condition develops higher strength than cold-working after quenching.

Rate of creep at elevated temperatures is materially affected by previous treatment. In general, precipitation hardening lowers the rate of creep as does cold working for temperatures up to 1300-F.

► Outstanding feature of the new Crosley engine is the cylinder block construction. This is made up of light-walled alloy steel tubing for the cylinders and cam-follower guides, and sheet steel stampings for cylinder heads, intake and exhaust ports, valve cases and water jackets.

► Longest cutter life is obtained when cutters have double negative rake angles and full depth of cut is taken along some definite corner angle, observations on the subject of face milling steel with carbide cutters indicate.

. . . The Welding of Nickel-Alloy

THE low-alloy nickel steels may be welded successfully by any of the commercial processes, i.e. metal arc, carbon arc, oxyacetylene, atomic hydrogen, electrical resistance, etc. The actual welding operation differs little from that used for mild-carbon steels except that it must be taken into account that alloy steels as a class possess greater hardenability than plain-carbon steels of the same carbon content. In welding processes such as metal arc and electrical resistance, the tendency to develop high hardness in the area adjacent to the weld must be controlled by such methods as preheating and postheating if the steel has much hardening power. Necessity for such control obviously occurs with lower carbon content in the alloy steels than in the plain carbon steels.

Factors Affecting Weldability in Metal-Arc Welding—Successful metal-arc welding of alloy steels depends to a large degree upon the same fundamental principles used in welding carbon steels. To understand fully why some steels may be welded readily while difficulties occur with others, it is necessary to have some knowledge of the metallurgical factors involved. By applying this knowledge, it may be possible to change conditions so that satisfactory welds may be made on steels which are generally considered to have poor weldability.

In the early applications of metal-arc welding to alloy steels, cracking difficulties not infrequently were encountered. These were sometimes traced, in part, to the conditions of welding, involving such variables as speed of arc travel, size of electrode, types of electrode coatings, etc. But it also became apparent that some of the commercial alloy steels most widely used for heat-treated machinery parts were especially sensitive to variations of this sort and developed hard brittle areas adjacent to weld deposits, which reduced the toughness of the welded joints and often cracked during or after cooling.

From such early experiences, weld hardening has become well recognized by the welding industry as a factor of importance in the selection of steels, in establishing the details of processing and in the utilization of these metals in welded structures.

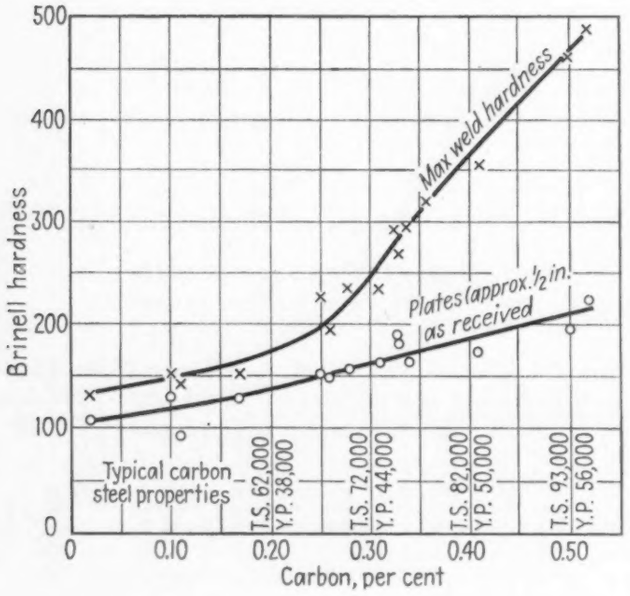
It is not to be assumed that absence of weld hardening is all that is needed to provide a satisfactory welding steel but, on the other hand, a high weld hardening capacity means that the steel will be weldable only under restricted conditions.

In making a metal-arc weld, a small area of the base is heated above the melting temperature. Filler material, in the form of the electrode, is also melted locally by the arc and fuses with the molten surfaces of the base. It is obvious that the parent metal adjacent to the weld will become quite hot. As the arc is moved away from this location, the weld and the metal adjacent to the weld cool very rapidly by conduction. Although no change has occurred in the composition of the parent metal in the heat-affected zone, except to a limited extent at the fusion line, decided changes have occurred in the physical characteristics. The time-temperature relations in both heating and cooling comprise, for practical purposes, a heat treatment and, if the steel to be welded has a high hardening capacity and hardening tendencies, it may develop undesirable highly hardened zones adjacent to deposited metal. It is these changes in properties in the heat affected zone of the parent metal which affect to a large degree the welding characteristics of steel.

It should not be assumed that weldability can be predicted entirely from the weld hardness or from composition. Two steels having almost identical composition may have different hardening characteristics and two steels of similar hardening characteristics may have widely different cracking tendencies. High weld hardness is a contributing factor, however, as brittleness accompanies high hardness. Some recent investigations indicate that susceptibility of the base metal to weld cracking may be due to a combination of high hydrogen content in the steel and high hardness (martensite) resulting from rapid cooling. There is considerable evidence[4] that electrode coatings containing relatively high per-

o o o

FIG. 1—Effect of carbon content in plain-carbon steels on weld hardening (French and Armstrong).



Steels

This article thoroughly explores the subject of welding nickel-alloy steels, from the standpoint of the various welding processes used, effects of composition and heat treatment on physical properties, and results obtained from the use of different electrodes. Herein, the first section of four parts deals with the factors influencing weldability and hardenability with respect to welding by the metal-arc process.

By T. N. ARMSTRONG
Development & Research Division, International Nickel Co., Inc.

o o o

centages of combined water and organic matter are the most probable source of hydrogen in the weld metal, but the evidence is not so clear-cut that hydrogen introduced through the electrode affects the base metal. Experience indicates, however, that cracking tendencies are lowered in some highly hardenable alloy steels by welding with electrodes covered with a lime or other inert type of coating.

Remarkable progress has been made in the last several years in improving electrode coatings. There are now available several commercial grades of electrodes which permit welding of some hardenable grades of low alloy steels without necessity of preheating, and frequency of underbead cracking is quite low. It appears safe to predict that these electrodes will be applied more widely as knowledge of their characteristics becomes more general.

Tests for Weldability—Bead Hardness Test—The results of weld-hardening tests on a few plain-carbon steels[2] are combined in fig. 1 with weld-hardening data, for somewhat similar welding conditions taken from different sources. The two lines drawn through the scatter bands of points represent as-rolled and maximum weld hardness of steels containing different carbon contents and illustrate the effects of carbon on the magnitude of weld hardening. The bottom line represents the hardness of as-rolled carbon steel. The top line represents the maximum hardness developed in the heat-affected zone of the same steels on welding single beads at a rate of 4 to 6 ipm with 3/16-in. covered electrodes on plates ½ x 6 x 9 in.

To determine the effect of alloying elements on weld hardness, tests were made similar to those already described for carbon steel. Steels with different percentages of a particular alloy at different carbon levels were welded and the hardness determined. From these data the derived curves in fig. 2 were prepared. The slopes of the several curves indicate the effect of alloying elements on weld hardness. The very potent effect of carbon will again be noted, with molybdenum, manganese, chromium, and nickel in descending order of effectiveness when considered on a weight-percentage basis. As manganese is present in practically all steels, the effect of this element when present in quantities below 0.70 pct was not determined.

The effects of welding speed and plate thickness are compared with the carbon effect in fig. 3. As the slopes of the curves representing hardness increase with faster welding speeds are approximately parallel, the inference is that increase in arc travel increases the hardness in about the same ratio at any carbon level between 0.20 and 0.45 pct carbon. These steels contained 2 pct nickel, but the same general trend has been observed in plain carbon steels.

The plate temperature may exert an appreciable effect on the magnitude of weld hardening, especially with those steels which have a relatively high hardening capacity. Precooling the plate increases the temperature gradients, tends to cause somewhat faster cooling of the heat-affected zones and clearly results in increase in maximum weld hardness.

If, instead of the selected test conditions representative of a single bead fillet weld, multiple-layer butt joints are examined, there may be appreciably less weld-hardening in the finished joint. This will be apparent from the hardness surveys on butt welded 5/8 and 1-in. plate of 2 pct nickel steel with

FIG. 2—Effects of C, Mn, Cr, Mo and Ni on weld hardenability of steels containing different carbon contents (French and Armstrong).

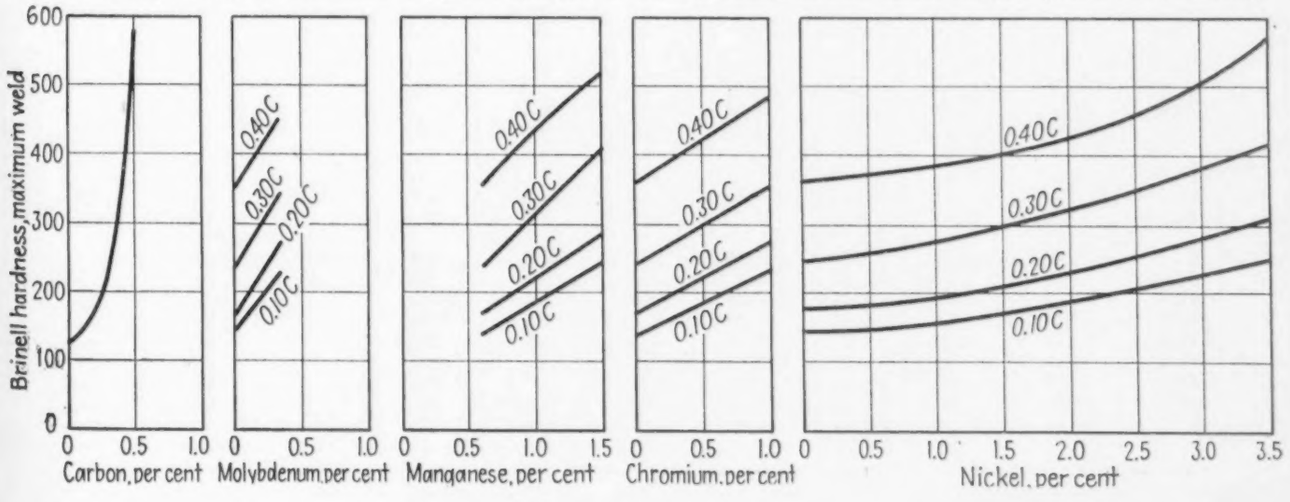


TABLE I

Effect of Preheating on Weld Hardness of Some SAE Nickel-Alloy Steels

Type	Composition, Pct					Weld Hardness on ½-in. Plates		
	C	Mn	Ni	Cr	Mo	Plate Hardness Annealed, Bhn	Brinell Hardness of Heat-Affected Zone, Welded Room Temperature	Brinell Hardness of Heat-Affected Zone, Preheated 600°F
SAE 4640	0.38	0.63	1.63	....	0.25	180	623	353
4340	0.43	0.71	1.71	0.65	0.33	221	788	660
4330	0.32	0.58	1.67	0.54	0.36	160	660	376
4320	0.20	0.65	1.95	0.28	0.29	148	418	294
3140 + Mo	0.42	0.63	1.35	0.57	0.27	188	720	460
2510 + Mo	0.09	0.86	5.35	....	0.34	200 (as rolled)	380	....
3115	0.17	0.46	1.29	0.60	.....	146 (as rolled)	287	....
4615	0.15	0.50	1.81	....	0.25	218 (as rolled)	294	....

Welded with 5/32-in. electrodes at a rate of 6 ipm.

approximately 0.20 pct carbon. The maximum hardness obtained from the single surface beads and in the multiple layer butt welds shown are as follows:

(0.19 to 0.22 pct C, 2 pct Ni Steel)

Single-surface bead at 5 ipm on ½-in. plate
235 Vickers

Single-surface bead at 5 ipm on 1½-in. plate
395 Vickers

Multiple-layer butt weld in 5/8-in. plate
228 Vickers

Multiple-layer butt weld in 1-in. plate
273 Vickers

It should be recognized that while lower weld hardness usually results with multiple layer welds, cracking in the heat affected zone most frequently occurs in laying down the initial bead. These cracks are not repaired and may even grow when subsequent beads are deposited.

The results already discussed show that many variables associated with the steel and the conditions of welding can affect the magnitude of weld hardening. This means that no one set of conditions comprising a weld-hardenability test can give an adequate picture for general purposes. Certainly it would be hazardous to conclude from any one set of welding conditions that a steel could or could not be welded commercially. Tests of this type can give only comparative values and show trends, but such information is of value in the selection of steels and setting the control for welding technique.

Perhaps a better basis for interpretation of weld-hardening tests can be obtained by comparing some of the results already described with the maximum hardness obtainable by rapid cooling of steels from high temperatures. In fig. 4 the curve marked "Maximum Hardness Obtainable by Quenching Carbon

TABLE II

Summary of Steel Types, Compositions, Grain Size and Weld-Bead Hardness Tests (Harder & Voldrich)

W. D. Steel Type	Chemical Composition, Pct					Grain Size	Vickers Hardness No. (10 Kg, 30 Sec)			
							Average in Parent Plate	Maximum in Heat-Affected Zone		
	C	Mn	Ni	Cr	Mo			−20° F Test	65° F Test	300° F Test
1335	0.33	1.49	0.03	0.08	0.001	5	188	...	446	339
1340	0.40	1.76	0.02−	0.06	0.001	5	226	...	566*	421
1350	0.44	1.56	0.02−	0.02−	0.003	5	213	...	554	393
2315	0.17	0.50	3.45	0.07	0.01	6	160	...	351	274
2330	0.33	0.72	3.50	0.12	0.03	3 & 6	240	...	554	498
2340	0.40	0.65	3.51	0.05	0.01	7	224	...	578*	548
3115	0.17	0.53	1.26	0.65	0.04	4-6	149	278	284	...
3120	0.21	0.46	1.19	0.59	0.05	7	148	289	287	...
3135	0.34	0.65	1.12	0.64	0.05	3 & 6	195	...	468	351
3140	0.38	0.73	1.16	0.56	0.01	5 & 6	204	...	536	342
X3140	0.38	0.74	1.31	0.69	0.02	3 & 6	233	...	585*	483
3145	0.41	0.70	1.35	0.63	0.09	5	267	...	578*	450
3240	0.39	0.49	1.73	1.03	0.04	6	287	...	585*	464
3250	0.50	0.45	1.81	1.07	0.09	7	345	...	642*	642*
3312	0.11	0.58	3.59	1.56	0.011	4 & 6	289	...	376	333

* Denotes cracks in heat-affected parent metal adjacent to weld bead.

Steel," is a reproduction of the curve prepared by Burns, Moore and Archer[3], who stated that the maximum hardness obtainable is shown to depend solely on carbon content, regardless of alloys in amounts present in the common SAE steels and regardless of austenite grain size.

[1] *"A Preliminary Investigation of the Constitution of Mild-Steel Arc-Weld Deposits," by H. A. Sloman, T. E. Rooney and T. H. Schofield; advance copy Iron & Steel Institute, July* 1945

[2] *"Weld-Hardening of Carbon and Alloy Steels," by H. J. French and T. N. Armstrong; Welding Journal, October* 1939.

[3] *"Quantitative Hardenability," by J. L. Burns, T. L. Moore and R. S. Archer; Trans ASM, 26, No. 1 March* 1938, *p.* 1.

If these conclusions with respect to liquid-bath quenching in heat treatment are assumed to be applicable to hardening on welding, the maximum hardness which can be developed in the pearlitic steels is indicated by the upper curve in fig. 4 and the maximum value obtainable is dependent solely upon the carbon content and not upon the presence of one or more alloying elements in the steel. This, in itself, supports the view that carbon contents in steels for welded structures should be kept at the lowest practicable values.

While maximum attainable hardness may be fixed by the carbon content, the alloys in the steel and the proportions present do exert an important influence upon the hardness numbers developed under fixed welding conditions.

In other words, while the maximum hardness attainable is dependent upon carbon content, the degree to which this maximum is approached under any set of conditions will depend not only upon the carbon content but also upon the alloys present. This is shown in fig. 4 by comparison of the highest attainable hardness in steels containing different carbon contents with the weld-hardness of carbon and 2 pct nickel steels welded under different conditions.

The range between the upper and lower curves in fig. 4 is in reality a range of hardenability over which the welding engineer has at least a certain degree of control. Obviously, he cannot reduce the section thickness if the structure requires heavy plates which tend to promote hardening in single-pass welding, but he can control such variables as the temperature of the parent metal by preheating, he can choose the size and type of electrodes and, within certain limits, the speed of arc travel, all of which can operate in the direction of reducing weld hardness.

Viewing fig. 4 from the broadest point of view, it should be apparent that the freedom in welding is relatively great in steels containing 0.10 pct or less of carbon. A reasonable degree of control is available to the welding engineer for many low-alloy steels containing from 0.10 to perhaps 0.20 pct carbon, but above this carbon content the allowable welding conditions become more and more restricted as the carbon is increased.

Preheating Steels with High-Hardening Capacity—Performance requirements sometimes dictate the use of steels with marked hardening tendencies and high-hardening capacity and, if welding is to be employed, some methods must be available for the procurement of sound and strong, yet ductile joints. Much is still to be learned about the technique of

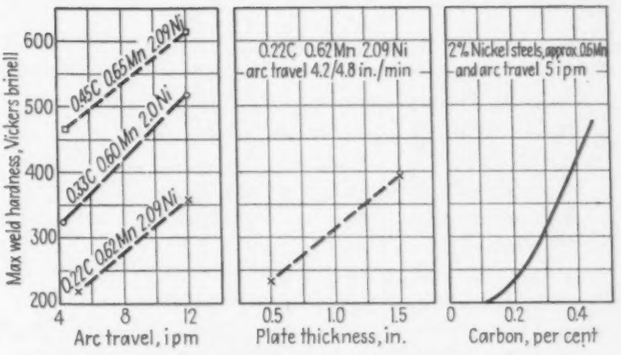


FIG. 3—Maximum weld hardness of 2-pct Ni steels as affected by arc-travel speed, plate thickness and carbon content (French and Armstrong).

o o o

welding those alloy steels coming under this classification. Within certain limits, preheating is useful and is one of the most successfully applied methods for welding hardenable steels. The effect of preheating on weld hardness of some SAE steels after welding with a single surface bead is shown in table I.

Weld-bead hardness tests of 34 steels representing plain carbon, nickel and nickel-chromium steels were made for the War Dept. and reported by Harder and Voldrich[4]. The plates were ½ x 3 x 6 in. and were welded at 65°F. If the weld hardness was hardness above 350 Vickers or if cracks developed, the tests were repeated with the plates preheated to 300°F. If weld hardness of plates welded at 65°F. was below 350 Vickers and no cracks developed the test was repeated on plates chilled to –20°F. Welds were made at a rate of 5 ipm with an automatic welding head with stick feed using 3/16 in. covered electrodes, average current 180 amp dc with the electrode positive and average arc voltage of 25. Results of the nine steels containing nickel and three steels alloyed with manganese are reported in table II.

It was pointed out that the effect of increasing the

o o o

FIG. 4—Maximum weld hardness of carbon and nickel steels welded under different conditions, compared to maximum attainable hardness by rapid cooling (French and Armstrong).

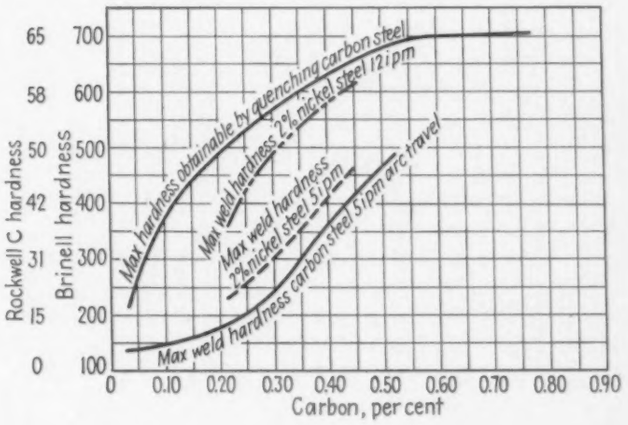


plate temperature from 65° to 300° F. was quite marked in decreasing weld hardness and cracking. Grain size apparently was of minor significance as compared to other variables, particularly carbon and manganese.

Several attempts have been made to develop mathematical formulas for caculating maximum weld hardness from composition of the steel being welded. A formula may be very useful, particularly when lack of facilities prevent making welding tests, but it should be recognized that such formulas apply to a restricted set of conditions. An empirical equation that has proved quite useful was developed by Edson[5] for calculating the maximum weld hardness of carbon and low-alloy steels within certain limits of composition.

This empirical equation, based upon relation of observed maximum weld hardness to chemical composition, is as follows:

$$\text{Log}_{10}\text{ Vickers Hardness No.} = 1.957 + 1.141 \times \text{pct C} + 0.193 \times \text{pct Mn} + 0.086 \times \text{pct Ni} + 0.160 \times \text{pct Cr} + 0.363 \times \text{pct Mo} + 0.180 \times \text{pct V} + 0.030 \times \text{pct Cu}.$$

The maximum limits of chemical composition to which the equation is restricted are as follows:

Pct C	Pct Mn	Pct Si	Pct Ni	Pct Cr	Pct Mo	Pct V	Pct Cu	Pct Al
0.50	1.75	0.40	3.75	1.25	0.40	0.30	2.00	0.05

In applying the equation to over 50 steels the calculated hardness was found to agree ±5 pct of the maximum hardness developed on welding with a single surface bead. The welds were made with 5/16-in. heavily coated electrodes, reversed polarity, 25 v, 180 to 200 amp, electrode travel 4¾ ipm on ½ x 6 x 9 in. plates.

End Quench Test—There are a number of other methods[6] than the bead hardness test for evaluating steels for weldability. Among these are the Jominy end-quench test and the notch-bend test sponsored by the Welding Research Council.[7]

TABLE III

Typical Ductility-Hardness-Jominy Distance Relations

Steel	Jominy Distance*		2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10	12	14	16	18	20	22	24	Over 24
SAE 2330	V H N		500	495	493	491	490	490	490	490	488	485	482	478	472	447	420	390	365	345	327	256
	Angle of Bend	Radial	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0	8.0	10	10	11	12	16
		Izod	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6.0
SAE 3135	V H N		560	550	543	541	540	538	533	535	503	473	440	408	368	343	327	312	300	290	282	250
	Angle of Bend	Radial	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0	5.0	6.0	7.0	9.0	10	11	12	12	13	14	17
		Izod	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.0	2.0	2.0	3.0	3.0	5.0
YOLOY	V H N		288	263	248	232	220	210	203	195	188	181	177	176	174	172	171	171	170	170	168	155
	Angle of Bend	Radial	21	23	24	26	27	29	29	30	32	33	34	34	34	35	35	35	35	35	36	38
		Izod	5.0	6.0	8.0	9.5	10	12	13	14	15	16	17	17	17	18	18	18	19	19	19	22
MAYARI	V H N		362	311	264	232	220	213	208	202	197	193	190	187	180	174	169	162	159	156	155	143
	Angle of Bend	Radial	11	17	20	24	27	28	29	30	31	32	33	34	35	37	39	41	42	43	43	48
		Izod	–	–	–	–	2.0	3.5	4.0	5.5	7.0	7.0	8.0	9.0	10	12	13	15	16	17	18	22
NE 8620	V H N		414	409	403	395	385	373	360	330	292	268	260	253	243	240	235	233	230	228	223	212
	Angle of Bend	Radial	10	10	11	11	12	13	14	16	20	23	24	25	27	28	29	29	29	30	31	32
		Izod	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	11
NE 8630	V H N		505	500	498	495	490	488	480	463	438	405	380	360	330	310	297	289	280	278	275	243
	Angle of Bend	Radial	4.5	4.5	4.5	4.5	4.5	4.5	5.0	6.0	7.0	8.0	8.5	10	11	13	14	15	16	16	16	19
		Izod	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	7.0
NE 8744	V H N		638	635	633	630	628	625	620	612	605	600	599	598	580	558	523	489	457	425	397	303
	Angle of Bend	Radial	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.5	3.0	3.5	4.0	4.0	7.0
		Izod	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3.0
NE 8749	V H N		618	610	602	597	593	591	590	587	585	582	576	562	533	479	444	421	405	387	369	289
	Angle of Bend	Radial	1.5	1.5	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5	3.0	5.0	5.5	6.5	7.5	8.0	9.0	14
		Izod	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3.5

* Sixteenths of an inch.

The end-quench test is one of hardness versus cooling rate. A 1-in. diam. bar 3 in. long of the steel to be tested is heated to 2100° F. for 30 min*. The bar is then placed in a fixture and a jet of water directed on the lower end of the bar until it becomes cold. A flat is ground along one side and Rc hardness determinations made every 1/32 in. along the bar starting at the quenched end. By referring to conversion tables the maximum hardness that will occur under different conditions with butt welds in that particular steel can be estimated.

Specimens for the slow notch-bend test are prepared by taking pieces of plate 1-in. wide of the thickness to be welded, heating to 2100° F, and cooling at three different rates by using different cooling media. A round notch of ⅛-in. radius is machined across the width (either Izod or V-type notch can be used). The hardness of the different pieces is measured and correlated with the cooling rate determined by the end-quench method. The pieces are then bent slowly in a jig and the angle of bend before cracking is plotted against hardness. For many structures an angle of 20° is considered safe. Typical ductility-hardness-Jominy distance relations for eight nickel-alloy steels are shown in table III.

*Procedure differs slightly from standard end-quench to determine the hardenability of steel.

Next week the author continues to discuss the metal-arc process, outlining the use of various tests as a means of evaluating steels for welding and of selecting welding electrodes.—Ed.

[4] *"Weld-Bead Hardness Tests on Some Carbon, Nickel, and Nickel-Chromium War Dept. Steels," by O. E. Harder and C. B. Voldrich, Welding Journal, October* 1943.

[5] *"Weld Hardening and Steel Compositions," by A. Edson, Metals and Alloys, June* 1942.

[6] *"A Comparison of Tests for Evaluating Weldability of 26 Low-Carbon Steels," by C. E. Jackson and G. G. Luther, Welding Journal, October* 1940.

[7] *"Guide to Weldability of Steels," Welding Research Council, New York, N. Y.*

Electric-Eye Flame Cutter

A NEW electric-eye tracing device for pantograph-type oxyacetylene machines for steel cutting operations has been announced by Air Reduction, New York. The new device, applied to machine-gas cutting in collaboration with General Electric Co., will be known as the Electronic Bloodhound. It completely eliminates expensive metal and wood templates and all other mechanical or manual auxiliary guiding devices.

Electronically controlled tracing equipment is said to cut the most complicated shapes with great precision from quickly prepared outline drawings or silhouettes of the desired piece. There are no limitations to the variety of designs which may be cut as the electronic tracing head faithfully follows the most complex angles and curves with extreme accuracy.

A new field of application has been opened in machine production cutting through the "chain" method of reproduction made possible with this type of template. In this chain method, a series of identical shapes are drawn on the template and connected with a continuous line, making production cutting of several pieces possible in a single operation.

In plants where a great variety of special-shape cut pieces are made, the economy of this low-cost template preparation is particularly important, although the economy and reduced scrap with electronic control equipment are said to be realized in standard production cutting as well. Alterations may be quickly made a fact of particular importance when small dimensional changes are made in a part. Where cutting machines are used for plant maintenance work, jigs and fixtures may be economically shape-cut with comparatively little effort.

Shape cutting is not limited to the ability of the tracing device to follow template contour, and sharp corners may be cut without subsequent machining or the use of elaborate jigs. Shapes are now cut directly from a drawing with precision and mechanical restrictions are eliminated.

Templates required for electronically controlled cutting are simple outline drawings or silhouettes—a black outline about ⅛-in. wide against a white background or any other color combination which provides sufficient light contrast. These drawings may be treated with a protective coating for long life.

The equipment consists of two units, the tracing head and control box. All working parts are fully protected and the electronic tubes designed for long life. The device is easily attached to any Oxygraph or Travograph cutting machine in place of conventional equipment.

CUTS such as these show the ability of electronic tracing equipment to follow any angle, contour or corner with great accuracy.

Common Sense In Job Evaluation

. . . In concluding this three-part article, the conversion of point values to dollar values is discussed and the use of the curve of standard conversion to establish a wage structure is described.

o o o

By DAVID ANDERSON
and
ARTHUR H. HANSEN
Chief Industrial Engineer and Director of Standards respectively, Bulova Watch Co., Woodside, N. Y.

o o o

FACTOR NO. 6: PHYSICAL EXERTION—Some physical exertion is required by every type of job regardless of its nature. Since all jobs require at least some physical attendance on the job, this is the minimum form of physical demand in terms of job evaluation. The degree of physical effort required by a job is determined on the basis of two yardsticks:

(1) The amount and type of physical exertion required by the work. In evaluating the amount and type of physical exertion, it should be borne in mind that it is the minimum physical strength required from the employees in order to perform the work that is considered. The strength which any job requires and the physical exertion which it demands is influenced by the weight of the materials handled, their size and shape, and the physical position in which the work must be performed and the amount of physical movement involved in performing a job.

(2) The continuity of the work in terms of the sustained physical and muscular effort which it requires. At any particular level of physical exertion, it is necessary to measure the degree of endurance required in terms of sustained muscular action. This, of course, is influenced by the continuity of the effort which is required of the employee. Thus in determining the weight to be assigned to the physical demand required by any job, it should be remembered that the continuity of the effort or exertion required by that job will have a definite influence on the total physical demand of the job.

FACTOR NO. 6
SCALE FOR PHYSICAL EXERTION
35 Points

Continuity of Exertion	Degree of Exertion		
	Light	Medium	Heavy
Seldom: (Under load less than 20 pct of the total time)	1 to 3	3 to 4	5 to 10
Occasional: (Under load for 21 pct to 44 pct of the total time)	3 to 4	5 to 6	7 to 15
Frequent: (Under load for 45 pct to 69 pct of the total time)	5 to 6	7 to 12	13 to 22
Constant: (Under load for 70 pct or more of the total time)	7 to 8	9 to 18	19 to 35

For the purpose of job evaluation the following subdivisions are generally made in determining the continuity of the physical exertion involved in performing the job.

(1) Where the physical exertion is sustained for less than 20 pct of the total time, it is considered as merely seldom.

(2) Where it is sustained for 21 pct to 44 pct of the time, it is considered occasional.

(3) Where it is sustained for 45 pct to 69 pct of the time, it is considered as frequent.

(4) Where it is sustained for 70 pct or more of the total time, it is considered as being continuous.

FACTOR NO. 7: RESPONSIBILITY FOR SUPERVISION—The weight of the factor of responsibility for supervision is measured in two ways. As used in this evaluation, this factor measures the degree to which a job requires the organization and the planning of the work and activities of others. It is also intended to measure the degree to which a job requires an employee to be self-supervisory.

Any job which involves the responsibility for the assignment of work to others, for establishing standards of performance or for checking the performance of others, or for assuming the responsibility for organizing their activities, places a definite obligation on the employee which must receive recognition under this factor.

In addition, recognition must be given to the degree

to which the duties of the job require an employee to be self-supervisory. Where a supervisor is always present on a job to check the work and to provide additional work as may be needed, the job may be said to have close supervision. Where the employee is required to depend upon himself alone for the proper performance of his work, the job can be said to be self-supervisory.

FACTOR NO. 8: RESPONSIBILITY FOR THE SAFETY OF OTHERS—The degree to which the performance of the duties involved in any job may present hazards to others, and the extent of potential injury, determines the weight to be given to this job characteristic.

The nature of many jobs involve the possibility of injury to others in their performance. The extent to which an employee is required to be continuously attentive and careful in controlling his actions in order to avoid injuries to others, and the degree of severity with which they may occur, is the measure of the responsibility imposed upon an employee under this characteristic. Since this caution involves the assumption of responsibility by an employee, and must be considered when selecting an employee for a job, it must be given proper weight in order to determine the value of any particular job.

FACTOR NO. 9: RESPONSIBILITY FOR EQUIPMENT AND MATERIAL—The possibility of incurring losses due to improper processing of material or mishaps to tools and equipment is frequently an important factor in determining the value of any job to a company. On those jobs where the material being handled is valuable or where the tools and equipment being used are both delicate and costly, the personnel selected for the job must be of a caliber sufficiently conscientious and competent so as not to incur excessive losses to the company. It will frequently be found that on certain types of work the value of the material being handled is as great, or greater, than the labor involved in the operation under consideration. In order to assure minimum losses on this work it may frequently be necessary to assign a higher caliber employee than the nature of the task itself might seem to indicate.

In evaluating responsibility for equipment and material, there are two things to be borne in mind. The first is the probability of loss as a result of the improper performance of the job. This is important because the greater the potential loss on an operation as a result of mishaps, the greater the responsibility that is placed on the employee to prevent or to take such steps as are necessary to minimize these losses. The second is the extent of the dollar loss in terms of material or equipment or in terms of delayed production which could occur as a result of any one instance of an employee's failure to exercise proper care. Even though a potential loss may not be a frequent occurrence on a job, if when a mishap occurs very substantial losses can occur to the company, then this condition places a responsibility on the employee for continuous caution and attention; and this responsibility must be properly evaluated.

FACTOR NO. 10: UNPLEASANT JOB CONDITIONS—The working conditions under which the job assignment must be performed has a decided effect on the desirability of any job. In order to evaluate properly the effect of the working conditions on the value of any job, it is necessary to measure the degree to which the physical and mental well being of the employee is adversely affected.

In weighing the job conditions, we should consider

FACTOR NO. 7
SCALE FOR RESPONSIBILITY FOR SUPERVISION
45 Points

Degree of Supervision Available	Responsibility for Organizing Work of Others		
	None	Has Helpers	Organizes Work of Others
Close supervision: (Always on job)	.....	1 to 5	6 to 12
Supervision easily available when required	1 to 3	4 to 9	10 to 25
Self-supervisory	4 to 6	7 to 20	21 to 45

FACTOR NO. 8
SCALE FOR RESPONSIBILITY FOR SAFETY OF OTHERS
15 Points

Possibility	Injuries		
	Slight Injury	Serious Injury or Temp. Disability	Perm. Disability, Fatal Injury
Little responsibility of accident; (Little care required)	1 to 2	3 to 4	5 to 8
Occasional possibility of accident; (Moderate care required)	2 to 3	4 to 6	7 to 10
Frequent possibility of accident; (Great care required	3 to 4	5 to 8	9 to 13
Constant possibility of accident; (Extreme care required)	4 to 5	6 to 10	11 to 15

FACTOR NO. 9
RESPONSIBILITY FOR EQUIPMENT AND MATERIAL
25 Points

Damage or Production Loss	Probability of Loss		
	Seldom	Occasional	Frequent
$1.00 to $100.00	1 to 2	3 to 4	5 to 6
$101.00 to $500.00	3 to 4	5 to 6	7 to 10
$501.00 to $1000.00	5 to 6	7 to 10	11 to 15
Over $1,000.00	7 to 8	9 to 15	16 to 25

Mathematical Procedure for Finding A "Mean", Showing The Line Of Average Relationship Between The Present Hourly Rates And The Assigned Evaluated Points

The least square method of preliminary adjustment is empirical, being based on the weighted means of the assigned number of evaluated points; and the correlation of the hourly rate to the points.

This correlation may be established through the reduction of the data to two simple simultaneous equations and the application of the following formula:

Y (adjusted rate per hour) = a + B (X) where X is the individual evaluated points

a = base value assigned per point at the minimum
b = value per point of increase above "a"

The equations for solutions may be set up as follows:

Equation #1 $y = Na + b(x)$
Equation #2 $xy = a(x) + b(x^2)$

Where:

x equal the sum of all the Job Rating Points to be considered
y equal the sum of all the hourly base rates
xy equal the sum of the products of the individual Job Rating points and the corresponding hourly base rate. (Note that this is not the product of the sum, but the sum of the products.)
x2 equal the sum of the squares of the individual Job Rating points
N equal the number of jobs

For example:

If we were to plot the following jobs and their present rates and assigned point values, the solution of the mean would be as follows:

Job Number	Present Rate	Evaluated Points	Computed "Mean" Rate
1	1.85	222	1.64
2	1.40	196	1.54
3	1.40	201	1.56
4	1.65	185	1.50
5	1.55	179	1.48
6	1.45	210	1.59
7	1.50	159	1.41
8	1.40	156	1.40
9	1.20	155	1.32
10	1.50	144	1.35
11	1.50	160	1.41
	16.20	1947	

$x = 1947$
$y = 16.20$
$xy = 2896.90$
$x^2 = 352,645$

Substituting in equation #1 and #2

Equation #1 $16.20 = 11a + 1947b$
Equation #2 $2896.90 = 1947a + 352645b$

Solving as simple simultaneous equations for the value of

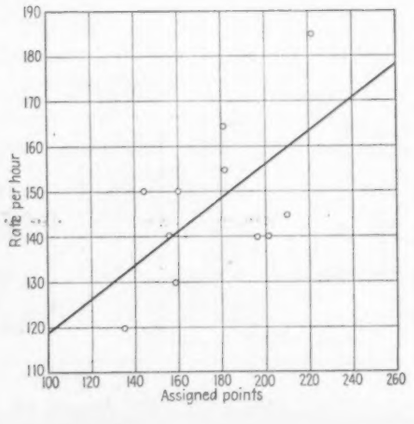
$a = .824$
$b = .005665$

Now referring to the formula we see that "a" becomes a constant for all jobs and "b" is the variable, dependent on the number of evaluated points, to be added to "a" to determine the adjusted rate.

Applying these values:

On Job #1 b = .005665 x 222 (assigned points) = .813186
+ .824 (constant for a)
$ 1.637

On Job #2 B = .005665 x 196 (assigned points) = .717948
+ .824 (constant for a)
$ 1.542



the degree to which the duties of the job under consideration expose an employee to the disagreeable conditions of excessive heat, cold, humidity, chips, fumes or oil. In addition, consideration should be given to the general atmosphere under which the job must be performed, that is, the lighting and spaciousness of the room, and the type of surroundings in which the job is done. It should be remembered that under job conditions, points are given only for disagreeable conditions and in proportion to the intensity of these undesirable factors.

FACTOR NO. 11: HAZARDS—Any condition on a job which adversely affects the physical well being of an employee assigned to it should be considered as a hazard on the job. The danger to the health of an employee as well as the possibility of accidental injury may be termed as adversely affecting physical well being.

In evaluating the degree to which a hazard exists, the probability of accident or ill health occurring should be considered first and second, the damage that might be sustained if and when such contingencies actually arise. For example, on some jobs, minor hazards such as scratches or light bruises might be a constant danger, on others, though the probability of frequent mishaps might not be great, when a mishap occurs, it might be serious. In evaluating a hazard, therefore, the probable frequency of minor accidents should be given consideration as well as the possible severity of serious accidents.

Converting Point Values to Money

The final step, after all descriptions have been accepted and point values assigned and totaled, is the conversion of the point totals into proportionate dollar value equivalents.

There are numerous methods that have been used for this conversion. The actual method selected by any particular plant will, of course, depend upon precisely what conditions prevail in the plant, and exactly what results are being sought in wage adjustments.

The first logical step that should be taken, however, would seem to be the determination of what the actual relationship is between the number of points that have been assigned through the evaluation and the present rates being paid. This may be done through plotting points on a graph against a vertical axis of money values and a horizontal axis of point values. By placing one point on the graph for every rate paid for each job evaluated, the average relationship between points and pay rates may be determined through plotting the mean line (a line of average relationships) for all the points charted. This may be done mathematically through the method of least squares which has been outlined herein. However in using this method, or any other, care should be exercised to be certain that the line of average relationships finally used should represent a weighted mean and not an arithmetic mean. If the mean line is plotted as a mean for the entire plant-wide chart, it will always be a straight line and represent an arithmetic mean. This line will not necessarily represent the point-dollar relationship in each bracket. It will merely show this relationship as a theoretical average for the plant. Since there is always a larger concentration of jobs in the lower wage brackets than the higher, these jobs will tend to exert an undue influence on the slope of the line and the line will, therefore, not reflect the actual point-dollar relationships in the other brackets.

FACTOR NO. 10
SCALE FOR UNPLEASANT JOB CONDITIONS
25 Points

Continuity of Exposure	Degree of Discomfort		
	Little	Moderate	Great
Occasional: Below 35 pct	1 to 2	3 to 4	5 to 8
Frequent: 36 to 65 pct	2 to 3	4 to 6	7 to 12
Constant: 66 pct	3 to 4	5 to 12	13 to 20

FACTOR NO. 11
SCALE FOR HAZARDS
20 Points

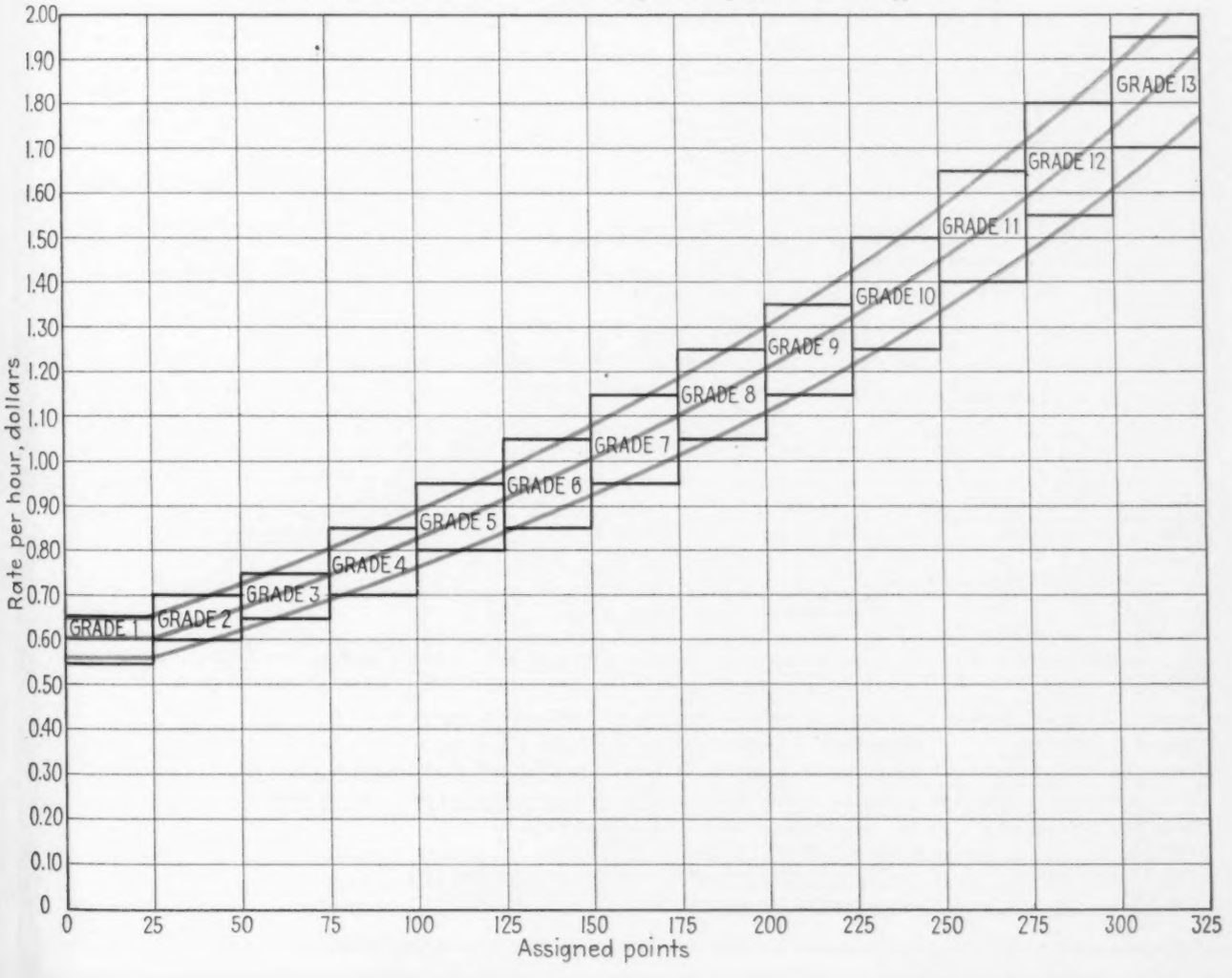
Probability	Effect on Physical Well Being		
	Minor Scratches, Burns, etc.	Temp. Disturbances, Broken Bones	Perm. Disability, Loss of Digits
Occasional	1 to 2	3 to 4	5 to 6
Frequent	2 to 3	4 to 6	7 to 10
Constant	3 to 4	5 to 10	11 to 20

In order to plot a weighted line which will actually show the average point-dollar relationship that exists in each bracket, the chart should be divided into a number of sections, equivalent to the number of labor grades which are expected to be established. (See accompanying graph.) The mean line—the line of average relationships—should then be computed separately for each section, and should be based on all the jobs falling between the minimum and maximum rate range of that particular section (labor grade). For example, if the rate range for a labor grade under consideration is 65¢ to 75¢ per hr, then all jobs in the plant at pres-

(CONTINUATION OF TEXT 134)

Job analysis sheets giving full description of job and point value ratings shown on the four following pages.—Ed. Note.

• • Point values can be converted to labor grades by use of such a typical curve



JOB ANALYSIS SHEET

OCC. NO.
DEPT. MACHINE SHOP
GRADE
POINTS 135

JOB TITLE Automatic Thread Grinder Operator

JOB DESCRIPTION

SUMMARY: Performs skilled operations of grinding external threads and annular grooves on a Jones & Lamson Automatic Thread Grinder. Sets up the machine which is automatic and makes all necessary adjustments; selects, balances and installs grinding wheels; adjusts the automatic wheel truing device; selects and installs change gears for speed of work; sets rheostat dial for proper wheel speed; adjusts selector switch for one-way or two-way grinding; selects and installs change gears for relief grinding; adjusts dogs on cam drum for wheel dressing before or after finished cut as desired; adjusts the coolant to the work; and sets and adjusts the grinding cycles. Checks the form, lead and depth of thread on the J & L Comparator; measures the pitch diameter on the P & W supermicrometer; and checks and adjusts the supermicrometer for accuracy.

(1) From the print the worker must learn the outside diameter of the work, the number of threads per inch, the form of thread, class of fit, the pitch diameter, the length of thread, whether the thread is straight or taper, and in the case of taps, whether they have a slight amount of taper, and the amount of relief.

(2) Very often it is necessary to determine by calculation the pitch diameter of the work, the helix angle, also the measurement over wires. When the correct size wires are not available, the next best size of wires must be selected.

(3) Makes selection of proper grinding wheel as to grade and grain for the desired finish, also the cutting qualities for speed of grinding, taking into consideration the material being worked. Wheels must be properly balanced by mounting on balancing arbor and stand, and adjusting buttons in the wheel flange. Withdraw the automatic wheel truing device to adjust the formers controlling the wheel-truing diamonds to the proper form of thread.

(4) Must understand the changing of diamonds, the use of the diamond setting gage, and the setting of diamonds on the Jones & Lamson Comparator.

(5) Sets and adjusts the feed wheels to the grinding cycles. The wheel must be adjusted to the proper helix angle; to the proper depth of thread; the coolant turned on and adjusted to the work; must be able to recognize a correctly cutting wheel. Sets the depth of cut, and on the feed ratchet, the depth of each wheel pass for the grinding cycle.

(6) Checks the work in process of grinding until finished.

(7) Checks the lead and form of thread, also the relief of thread on the J. & L. Comparator; checks the pitch diameter, using the three wire method on the P. & W. Supermicrometer.

(8) Selects from the chart and installs on the machine the proper change gears for the correct lead or pitch of thread.

(9) For work which has to be relieved, a second set of change gears must be selected and installed according to the number of flutes on the work, in the opposite end of the machine. The amount of relief must be determined and adjusted. When it is desired to dress the wheel after the finish cut or before the finish cut the dogs on the cam drum which control the switches must be properly placed. Any grooving on work having no lead requires a different change gear box, necessitating an exchange installation of gear boxes. The selector switch for the setting of "one-way" and "two-way" grinding must be properly positioned.

(10) Work performed includes; taps, master taps, thread gages, micrometer spindles, lathe spindles, hobs, gear hobs, worms, and various types of ordinary threaded work.

(11) Knowledge of the following precision instruments is required: Dial indicator, supermicrometer for measuring pitch diameter with wires; must understand checking accuracy of supermicrometer, and the J. & L. Optical Comparator for thread form, lead accuracy, and depth of thread.

(12) Must render service to others in checking angles, threads, contours, etc.

(13) Lubricates motors and parts of machine not connected with the lubricating system, and cleans the machine.

(14) Must understand the maintenance of the oil filter which includes pre-coating at intervals as required.

(15) Works to tolerances of 0.0001 inch.

(16) The job requires a dependable worker who will exercise extreme care and judgment and concentrate mental and visual attention closely to avoid damage to equipment and spoilage and waste of material and work in process. (17) Some supervision required.

JOB FACTORS	DESCRIPTION	POINTS
1. MENTAL DEVELOPMENT	Those Mental requirements involving the ability to reason systematically and absorb knowledge	30
2. KNOWLEDGE	The possession of the facts, information, and "know how" required for the successful performance of a job	15
a. METHODS, PROCESSES & PROCEDURES		6
b. MATERIALS		
c. TOOLS & EQUIPMENT		12
3. JUDGEMENT & INITIATIVE	Those requirements which demand the weighing of facts, reaching of decisions and the taking of action	16
4. PHYSICAL SKILL	The technique, precision or dexterity required by a job	16
5. MENTAL & VISUAL DEMAND	The degree of mental concentration and visual exertion required by a job	15
6. PHYSICAL EXERTION	The strength and endurance required by a job	10
7. RESP. FOR SUPERVISION	The degree of responsibility for work of others and the self reliance required by a job	2
8. RESP. FOR SAFETY OF OTHERS	The degree to which the work involved on any job may affect safety and well being of others	2
9. RESP. FOR EQUIPMENT & MATERIAL	The size of the losses which could be sustained by the company in the event of improper performance	3
10. JOB CONDITIONS	The degree to which undesireable conditions are present on a job	3
11. HAZARDS	The dangers to personal well being inherent in any job	5
	TOTAL	135

FACTOR NO. 1 MENTAL DEVELOPMENT

MATHEMATICS

- ☐ Whole Nos.
- ☐ Fractions & Decimals
- ☐ Shop Arithmetic
- ☒ Handbook Formulas
- ☐ Algebra, Geom., Trig., Etc.
- ☐ Advanced

SCIENCES

Work involves:

- ☐ No Theoretical Understanding
- ☐ Simple Theoretical Understanding
- ☒ Logical Processes & Elem. Sciences
- ☐ Difficult Problems in Theory &/or Sciences
- ☐ Complex Technical Material
- ☐ Research & Development

LETTERS

- ☐ Read & Write
- ☒ Compile Simple Reports & Data
- ☐ Compile Difficult Reports & Data
- ☐ Compose Difficult Copy (Orig.)
- ☐ Drawing &/or Chart Work
- ☐ Research

BASIS OF RATING: MENTAL DEVELOPMENT

Calculates the pitch diameter, the helix angle and size over wires. Checks the form, lead and depth of thread to print specifications on a J. &. L. Comparator.

30

FACTOR NO. 2 KNOWLEDGE

A—METHODS, PROCESSES & PROCEDURES

WORK INVOLVES KNOWLEDGE OF:

- ☐ Simple Repetitive Procedures
- ☒ A Wide Variety of Standardized Processes or Procedures
- ☐ Layout & Development
- ☒ Planning & Laying out Unstandardized Work
- ☒ Fits, Alignment, Tolerances
- ☐ Process Determination
- ☐ Tool Determination and Development
- ☒ Determination of Feeds and Speeds
- ☒ Work Holding Methods
- ☐ Work Place Layout
- ☐ Work Analysis
- ☒ Inspection Techniques
- ☐ Procedure, Organization

BASIS OF RATING: METHODS, PROCESSES & PROCEDURES

Automatic features of the machine require a knowledge of a variety of standardized processes and procedures; plans unstandardized work, works to close tolerances. Uses Supermicrometer for checking size over wires, and J. & L. Comparator for checking lead and depth of thread.

15

B—KNOWLEDGE OF MATERIALS

WORK INVOLVES KNOWLEDGE OF:

- ☒ Common Materials ☐ Uncommon Materials
- ☐ Identification of Basic Materials
- ☐ Selection of Materials
  - ☒ Machinability ☐ Hardenability ☐ Strength ☐ Physical Characteristics
- ☐ Processing of Materials
  - ☐ Special Tooling ☐ Heat Treatment ☐ Mill Treatment
- ☐ Testing of Materials
  - ☐ Examination ☐ Testing ☐ Analysis
- ☐ Development of New Materials

BASIS OF RATING: KNOWLEDGE OF MATERIALS

Must have a working knowledge of common materials sufficient for selecting the grinding wheels best suited for imparting the desired finish to the material being ground. Also is required to know grains and grades of grinding wheels.

6

C—KNOWLEDGE OF TOOLS & EQUIPMENT

WORK INVOLVES KNOWLEDGE OF:

- ☐ A Simple Machine Operation
- ☒ Operation of Variety of Machines
- ☐ Tool Setting
- ☒ Tool Grinding
- ☒ Selection of Feeds and Speeds
- ☒ Jigs, Fixtures, Chucks, Etc.
- ☒ Setting up Equipment
- ☒ Selection of Equipment
- ☐ Repair of Equipment
- ☒ Gages, Indicators, Micrometers, Etc.
- ☐ Standards of Machine or Tool Performance

BASIS OF RATING: KNOWLEDGE OF TOOLS & EQUIPMENT

Setting up of this machine is equal to that of a variety of machines, calling for the selection of equipment, feeds and speeds, dressing of wheels, and the use of precision measuring instruments.

12

FACTOR NO. 3 JUDGEMENT & INITIATIVE

JUDGEMENT

- ☐ Simple Decisions Involving only Routine Alternatives
- ☒ Ordinary Decisions Based on Precedent but Involving Several Factors or Alternatives
- ☐ Difficult Decisions Involving Important Consequences with little or no Precedent

INITIATIVE

- ☐ Little or None
- ☒ Definite Initiative Required
- ☐ Extensive Initiative Required

BASIS OF RATING: JUDGEMENT & INITIATIVE

Chooses between several depths of cuts-in setting the grinding cycles - Chooses speeds calculated to produce the desired surface finishes.

16

FACTOR NO. 4 PHYSICAL SKILL

DEXTERITY

- ☐ Little (Simple Motions & Rythms)
- ☐ Moderate (Acquired Motion Patterns—Eye Hand Coordination)
- ☒ High (Difficult Motion Patterns, Minimum of Rythm & Repetition, Sensitive Movements)
- ☐ Exceptional (Complex Patterns of Extreme Delicacy, High Coordination of Fingers, Hands, Eyes, Extremely Difficult Synchronization, Sensitivity)

PRECISION

- ☐ Easy Limits by Eye
- ☒ Average Limits (Good Eye-Hand Coordination)
- ☐ Close Limits (Difficult Eye-Hand Coordination and Control)

INTEGRATION

- ☐ Handle Few Elements
- ☐ Handle Difficult Detail
- ☒ Integrate Many Diverse Elements

BASIS OF RATING: PHYSICAL SKILL

Uses J. & L. Comparator and Supermicrometer requiring extremely sensitive touch and good eye-hand coordination. Requires extreme care in setting the grinding cycles and in bringing the wheel to the work.
Integrates many diverse elements in the operation of a single machine.

16

FACTOR NO. 5 MENTAL & VISUAL DEMAND

DEGREE OF CONCENTRATION

- ☐ Slight
- ☒ Moderate
- ☐ Intense

CONTINUITY OF CONCENTRATION

- ☐ Seldom (20% or less)
- ☐ Occasional (21% to 44%)
- ☐ Frequent (45% to 69%)
- ☒ Continuous (70% to —)

WORK INVOLVES

- ☐ Rough Work ☒ Close Work ☐ Exact Work
- ☐ Feed Work to Manually Operated Machine
- ☐ Feed Work to Semi-Automatic Machine
- ☐ Hand Operation
- ☒ Visual Inspection
- ☐ Coordinating Many Elements
- ☐ Making Detailed Computations

BASIS OF RATING: MENTAL & VISUAL DEMAND

Continuous concentration needed in setting-up the machine. Close visual attention is necessary during the grinding and inspection operations.

15

FACTOR NO. 6 PHYSICAL EXERTION

DEGREE OF EXERTION—STRENGTH

☐ Light ☒ Medium ☐ Heavy

CONTINUITY OF EXERTION

- ☐ Seldom (20% or Less)
- ☐ Occasional (21% to 44%)
- ☒ Frequent (45% to 69%)
- ☐ Continuous (70% to —)

WORK INVOLVES:

☒ Standing	☐ Sitting	☐ Both
☐ Small Materials	☒ Medium	☐ Large
☒ Walking	☐ Lifting	☒ Bending
☐ Hand Truck	☐ Hoist	

BASIS OF RATING: PHYSICAL EXERTION

Changing the wheel truing attachment, setting the dogs on the cam drum and changing grinding wheels calls for a medium degree of physical exertion. Changing the gear box for annular grinding calls for a moderate degree of physical exertion.

10

FACTOR NO. 7 RESPONSIBILITY FOR SUPERVISION

DEGREE OF SUPERVISION AVAILABLE
☐ Close ☒ Available when needed ☐ Self Supervising

RESPONSIBILITY FOR ORGANIZING WORK OF OTHERS
☒ None ☐ Has Helpers ☐ Organizes Work of Others

BASIS OF RATING: RESPONSIBILITY FOR SUPERVISION

Some supervision required.

2

FACTOR NO. 8 RESPONSIBILITY FOR SAFETY OF OTHERS

PROBABILITY OF INJURY TO OTHERS:
☒ Little
☐ Occasionally
☐ Frequently

DEGREE OF POTENTIAL INJURY TO OTHERS IN THE EVENT OF ACCIDENT:
☒ Slight (Cuts, Bruises, Scratches)
☐ Severe (Serious Injury or Temporary Disability)
☐ Permanent Disability or Fatal Accident

BASIS OF RATING: RESPONSIBILITY FOR SAFETY OF OTHERS

Little probability of injury to others except those assisting in changing or setting-up equipment. Little danger from wheel breakage.

2

FACTOR NO. 9 RESPONSIBILITY FOR EQUIPMENT & MATERIAL

VALUE OF POTENTIAL DAMAGE OR PRODUCTION LOSS	PROBABILITY OF LOSS		
	SELDOM	OCCASIONAL	FREQUENT
$ 1 to 100	☐	☐	☐
101 to 500	☒	☐	☐
501 to 1000	☐	☐	☐
Over 1000	☐	☐	☐

BASIS OF RATING: RESPONSIBILITY FOR EQUIPMENT & MATERIAL

The work in process is in its final stages carrying the accumulated value of previously performed operations.

3

FACTOR NO. 10 JOB CONDITIONS

☐ Good ☒ Average ☐ Poor

Occasional	Continuous		Occasional	Continuous		Occasional	Continuous		Occasional	Continuous	
☒	☐	Vibration	☐	☐	Heat	☒	☐	Dust	☐	☐	Goggles
☒	☐	Noise	☐	☐	Humidity	☐	☐	Gloves	☐	☐	Fumes
☐	☐	Cold	☐	☐	Poor Lighting						

BASIS OF RATING: JOB CONDITIONS

Slight vibration, oily, some noise from surrounding machines.

3

FACTOR NO. 11 HAZARDS

Nature of Hazard — ☒ Occasional — ☐ Frequent — ☐ Constant

☒ Scratches	☐ Burns	☒ Loss of Digits
☒ Bruises	☐ Broken Bones	☐ Loss of Limbs
☐ Skin Irritations	☐ Falls	☐ Illness

BASIS OF RATING: HAZARDS

One careless movement may result in loss of digits

5

16-25-6 Alloy For Gas Turbines

The first part of this two-part article appeared in last week's issue, and described the development, production, room-temperature properties, and microstructure of this alloy.* This week, cold-worked properties are described and the alloy is compared with other austenitic and pearlitic steels.

By MARTIN FLEISCHMANN
Metallurgical Engineer, Timken Roller Bearing Co., Canton, Ohio

As this alloy* is an austenitic material, it does not undergo any phase changes on heating and, therefore, cannot be hardened by standard thermal treatments. Its physical properties, however, are materially affected by cold work. It should be understood that cold working is effective to different degrees up to temperatures exceeding 1700°F. Finishing temperatures in rolling and forging, therefore, greatly influence the final strength of the product. Data on the physical properties of 16-25-6 alloy illustrating the effect of cold work, expressed by varying percentages of elongation, were obtained on the alloy in the hot-rolled and solution-quenched condition.

* *Composition and process patents and trademarks either applied for or issued.*

Material for this investigation was secured in the form of hot-rolled 1¼-in. round bars. Duplicate sets of specimens were pulled in a standard tensile machine to definite elongations of 5, 10, 15, 20, 25, and 30 pct, respectively. This was accomplished by marking a 4-in. gage length on previously machined ⅞-in. round portion of the 1¼-in. round bar samples which were then elongated to the predetermined length measured by dividers. These lengths were calculated to give the required percentage of elongation. The material, typical for austenitic alloy, elongated uniformly between the punch marks of the specimens. Standard

FIG. 22—Effect of cold work on the physical properties of hot-rolled 16-25-6.

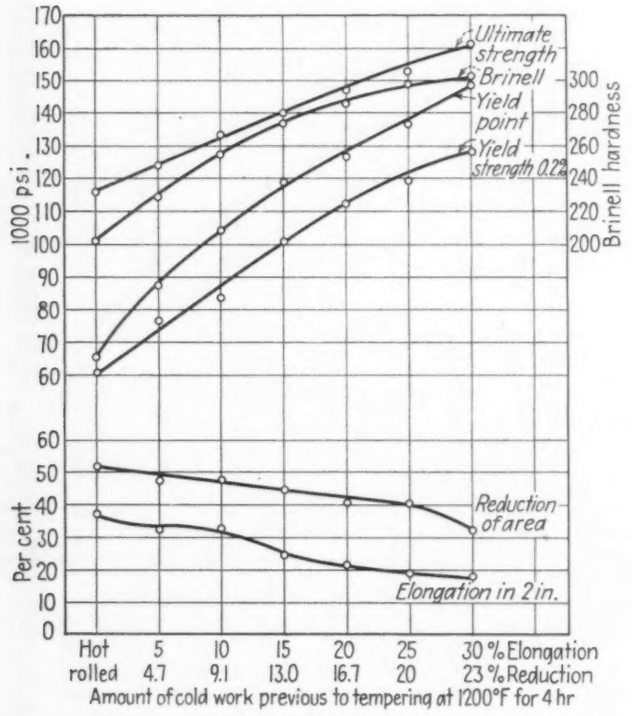


FIG. 23—Effect of cold work on the physical properties of solution-quenched 16-25-6.

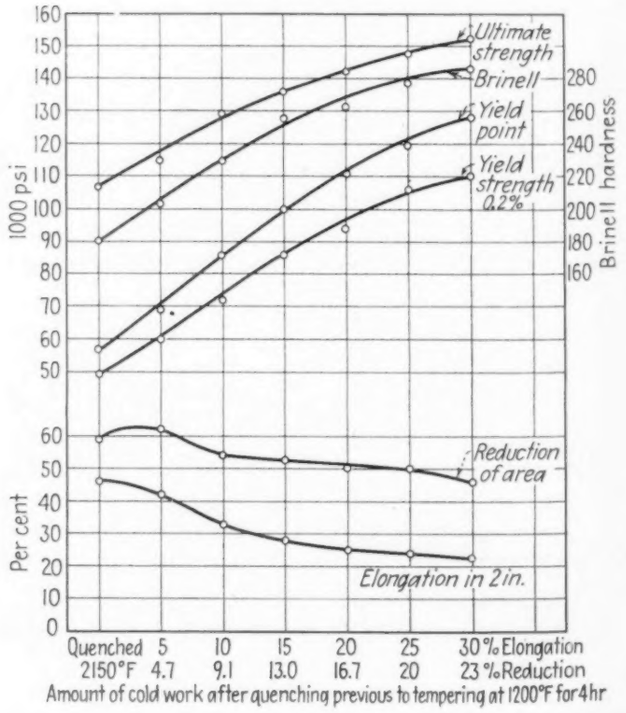


TABLE I

Rockwell "C" Hardness of Cold Worked and Tempered 16-25-6 Alloy

(A) Original Condition: 1¼ In. Round Hot-Rolled Bars

Tempering Time, Hr	Degree of Cold Work (Pct Elongation) 0	5	10	15	20	25	30
Tempering Temperature 1200°F							
0	13.5	24.0	27.8	29.7	32.9	33.9	35.0
1	15.2	23.5	26.5	29.1	31.0	32.1	34.6
4	16.4	23.3	26.1	28.7	30.6	31.4	32.8
10	16.4	23.6	25.8	28.0	29.0	30.8	32.6
24	18.1	23.2	24.6	26.9	28.4	29.7	31.1
72	16.4	24.8	27.1	29.1	28.9	31.2	32.2
Tempering Temperature 1300°F							
0	14.9	24.0	27.2	30.4	32.0	33.7	34.0
1	15.0	23.0	24.9	26.0	29.2	29.8	30.2
4	14.9	22.5	24.8	25.0	27.8	28.5	29.3
10	16.3	23.4	25.2	25.2	27.8	28.0	29.3
24	14.6	22.3	24.2	25.1	26.9	28.7	27.8
72	17.6	22.6	26.3	25.5	27.3	28.4	28.5
Tempering Temperature 1400°F							
0	14.5	23.3	27.2	29.1	32.9	33.8	34.3
1	14.2	22.6	24.3	25.5	27.7	28.3	28.8
4	13.8	20.9	23.4	24.2	26.5	27.5	27.6
10	14.9	21.7	23.2	24.3	25.4	26.6	26.3
24	13.9	19.8	22.3	22.8	24.1	25.4	25.7
72	14.7	19.8	22.3	22.4	24.1	26.1	25.5
Tempering Temperature 1500°F							
0	14.5	23.0	27.2	29.3	31.9	34.1	34.3
1	12.7	21.0	22.6	23.2	26.4	27.5	27.9
4	12.6	19.4	21.3	22.4	25.2	25.5	26.7
10	11.0	17.1	19.2	21.0	22.6	24.2	24.7
24	11.6	16.4	18.6	19.3	21.0	22.2	23.4
72	9.8	16.3	18.0	19.8	21.4	22.1	22.6
Tempering Temperature 1600°F							
0	13.6	24.4	27.8	30.0	31.0	33.7	34.8
1	13.4	19.3	20.8	23.6	23.7	24.9	25.6
4	12.3	18.2	19.6	21.4	22.7	23.4	24.7
10	11.9	16.1	18.2	20.2	21.8	22.0	21.3
24	10.6	15.6	17.6	18.7	19.9	20.9	19.3
Tempering Temperature 1700°F							
0	14.9	23.0	26.3	29.0	31.6	33.0	33.0
1	12.7	17.7	19.7	21.2	23.3	23.3	21.7
4	11.3	16.1	18.6	20.8	22.1	20.9	19.4
10	11.2	15.3	18.6	19.8	17.7	15.9	13.0
24	10.2	14.8	16.7	18.6	16.8	14.3	13.0

(B) Original Condition: Solution Quenched from 2150°F

Tempering Time, Hr	Degree of Cold Work (Pct Elongation) 0	5	10	15	20	25	30
Tempering Temperature 1200°F							
0	4.1	14.0	20.3	25.1	26.5	29.3	30.0
1	5.1	14.8	20.3	23.9	26.3	28.8	30.8
4	4.9	15.6	20.5	24.5	27.0	29.2	31.0
10	8.2	18.9	24.2	27.3	28.3	29.8	30.8
24	9.9	20.0	25.2	26.7	27.7	29.3	30.4
72	18.8	25.1	27.3	29.3	28.8	28.3	29.7
144	20.5	....	....	....	....	....	....
216	21.4	....	....	....	....	....	....
Tempering Temperature 1300°F							
0	5.4	16.3	20.5	26.4	27.6	29.4	31.6
1	6.5	18.7	23.2	26.7	27.9	29.5	29.9
4	10.0	21.2	24.6	26.8	28.0	29.1	30.0
10	16.3	23.2	26.5	26.8	27.4	27.7	27.9
24	17.9	22.8	24.3	25.7	26.6	25.8	24.7
72	19.8	27.9	25.2	25.8	26.9	26.6	26.9
144	20.5	....	....	....	....	....	....
216	20.9	....	....	....	....	....	....
Tempering Temperature 1400°F							
0	5.4	15.0	20.2	26.0	26.9	30.1	30.9
1	8.5	19.6	23.1	25.7	26.3	27.3	28.2
4	15.0	21.3	23.7	24.5	25.9	25.1	26.1
10	17.8	20.7	21.7	23.2	23.3	23.5	24.0
24	18.1	20.4	21.3	24.1	22.8	22.7	22.8
72	18.4	20.9	22.7	22.1	24.0	24.2	23.6
Tempering Temperature 1500°F							
0	5.2	15.5	20.0	26.7	27.3	29.4	29.6
1	11.5	19.2	22.6	24.6	25.2	26.4	25.8
4	13.1	18.8	20.2	21.7	22.4	22.9	21.6
10	13.3	18.5	18.7	19.7	20.8	21.6	20.6
24	11.1	17.1	17.6	19.3	19.6	20.7	19.5
72	13.4	17.5	18.0	18.6	20.0	21.1	19.8
Tempering Temperature 1600°F							
0	5.3	13.7	20.4	25.2	26.1	29.2	30.7
1	10.9	16.0	19.5	19.9	20.2	21.9	22.8
4	12.3	15.1	17.1	18.4	19.7	19.9	20.7
10	10.1	12.8	16.4	17.9	18.0	18.7	19.7
24	10.0	12.1	16.0	16.5	16.4	18.4	18.7
Tempering Temperature 1700°F							
0	4.9	12.6	19.9	25.1	27.4	27.8	30.4
1	8.4	12.9	16.3	17.8	18.4	18.8	20.3
4	8.7	11.8	15.8	17.2	18.5	19.5	20.4
10	7.6	10.6	15.0	14.7	18.2	17.8	19.9
24	8.3	14.9	14.9	15.6	16.6	17.5	17.6

0.505-in. diam tensile specimens were machined from these elongated portions. All tensile specimens were tempered at 1200°F for 4 hr. Physical property tests were conducted on these samples covering the following range of conditions; elongation varying from 0 to 30 pct in 5 pct increments on both hot-rolled and as-quenched samples, followed by a 1200°F temper for 4 hr. Results of the tests are given in the graphs, figs. 22 and 23.

Longitudinal samples were cut from the previously elongated portion. Typical photomicrographs illustrating the microstructures observed are shown in figs. 24 to 27.

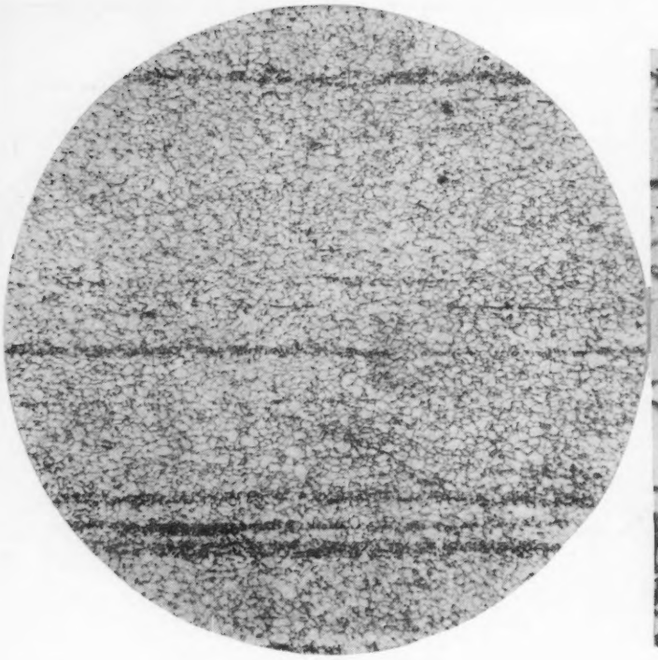
As may be seen from the curves, the cold working has a definite effect upon the physical properties of the steel. This effect is fairly uniform as most of the properties show a smooth curve and in some cases practically a straight line.

The effect of cold work on the microstructure may readily be observed in the photomicrographs. In addition, a precipitation effect may be noticed in the quenched samples with more than 10 pct elongation.

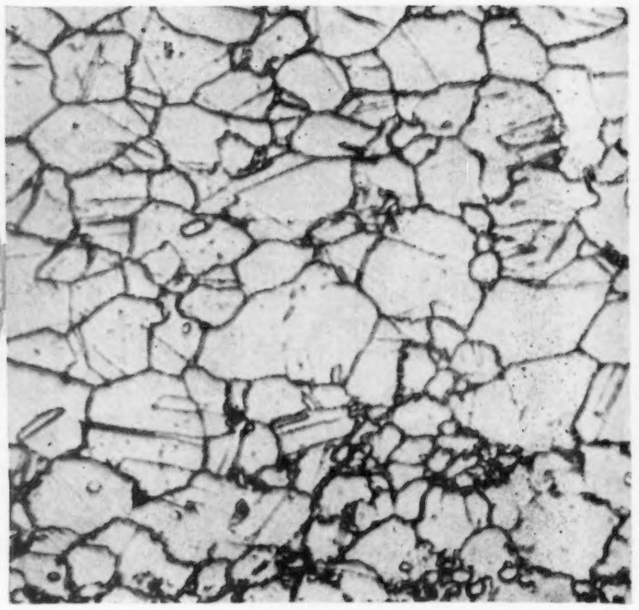
The specimens cold-worked from the hot-rolled condition gave higher strength properties than the bars cold-worked after quenching. The ductility values of the hot-rolled and cold-worked material were somewhat lower than those of the quenched and cold-worked specimens.

Hardness and Microstructure

In order to obtain fundamental data on the effect of cold work and tempering on the precipitation hardening of 16-25-6 alloy, a series of tempering tests were conducted on cold-worked samples. It was decided to study this effect on the hot-rolled material as well as on the solution-treated alloy. The solution treatment chosen consisted of a quench from 2150°F into water. The combination of three variables, (1) amount of



100 X



1000 X

FIG. 24—Hot-rolled, elongated 15 pct by cold work and tempered for 4 hr at 1200°F.

cold work, (2) tempering temperature, and (3) time at tempering temperature, had to be investigated as to their effect upon hardness.

The cold work was performed, similar to the procedure mentioned previously, at room temperature in a tensile testing machine. The Rockwell hardness tester employing the "C" scale was used in determining the hardness values.

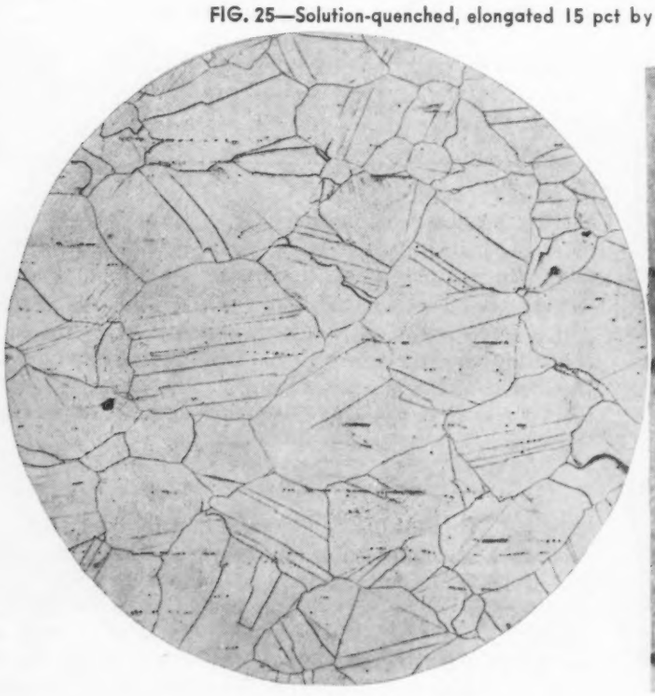
Table I contains the average hardness values on all cold-worked samples before and after the various tempering treatments. Each Rockwell C value shown represents an average of at least ten readings. These hardness values are also incorporated in the graphs, figs. 28 to 35.

The effect of cold work upon the hardness of hot-rolled 16-25-6 alloy is shown in fig. 28. This graph also illustrates the effect of a subsequent 10-hr temper at temperatures from 1200° to 1500°F upon the hardness of the cold-worked material.

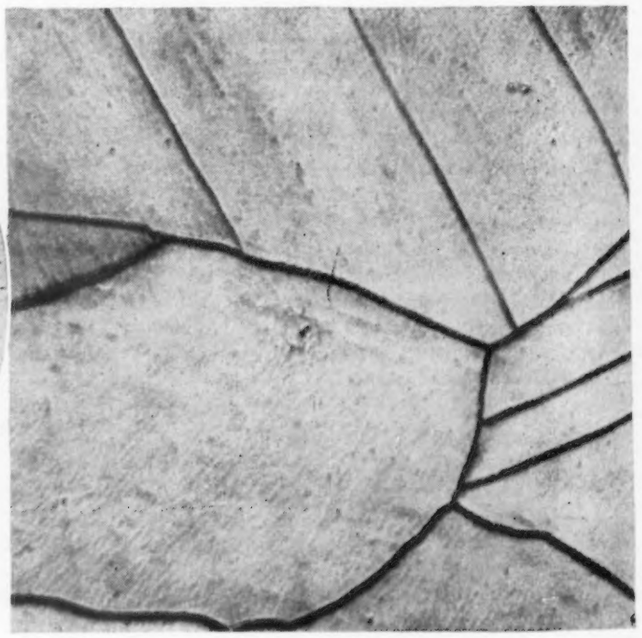
Fig. 29 may be used as a practical guide to determine the necessary amount of cold work and the allowable maximum tempering temperature (4 hr at heat) to assure a specified minimum hardness.

Fig. 30 gives the relation between hardness and

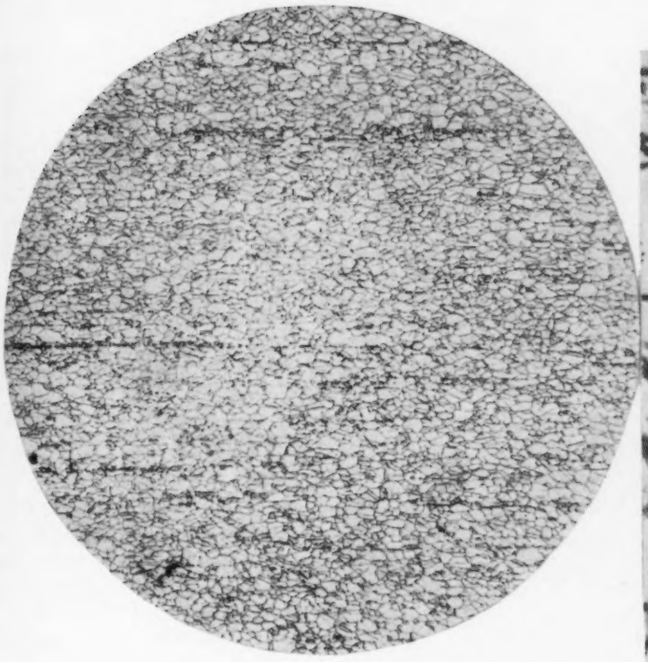
FIG. 25—Solution-quenched, elongated 15 pct by cold work, and tempered for 4 hr at 1200°F.



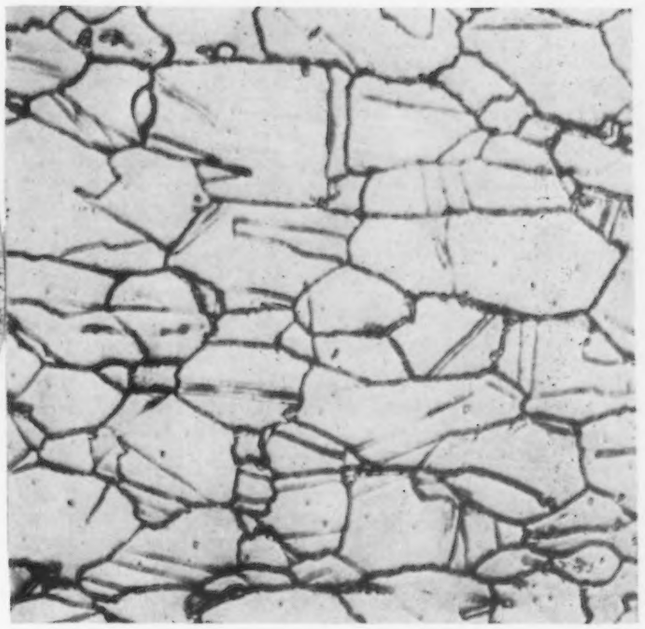
100 X



1000 X



100 X



1000 X

FIG. 26—Hot-rolled, elongated 30 pct by cold work, and tempered for 4 hr at 1200°F.

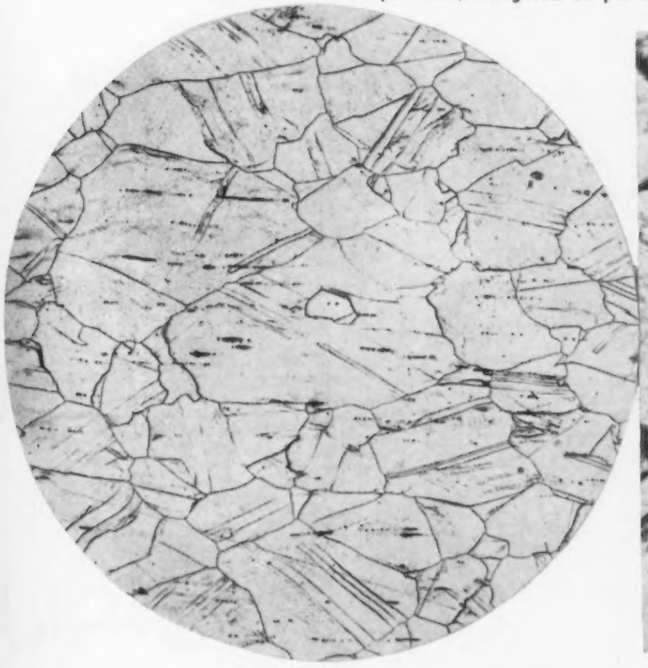
time at tempering temperatures from 1200° to 1700°F for the hot-rolled 16-25-6 alloy. These curves illustrate that tempering up to 1400°F causes a gradual increase of the hardness of the hot-rolled material, indicating precipitation hardening. At higher tempering temperatures the hardness of the hot-rolled alloy drops slightly with time at temperature pointing towards coagulation of the precipitate or overaging.

Effect of Tempering Temperature

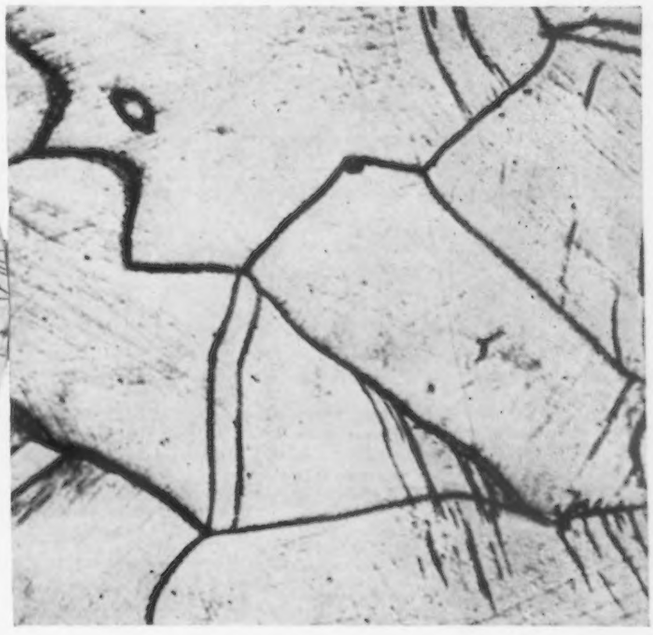
The effect of tempering temperature and time upon the hardness of hot-rolled 16-25-6 alloy subsequently cold-worked by 20 pct elongation is shown in fig. 31. These curves indicate that about 20 hr at tempering temperature are required to reach an apparent equilibrium between stress relief, precipitation hardening and precipitate coagulation for all temperatures from 1200° to 1700°F. It appears significant that the loss in hardness by tempering at 1200°F for 72 hr is only about 5 points, Rc.

The effect of cold work upon the hardness of the solution-treated material (quenched from 2150°F into water) is illustrated in fig. 32, which also shows the effect of subsequent temper for 10 hr at temperatures

FIG. 27—Solution-quenched, elongated 30 pct by cold work, and tempered for 4 hr at 1200°F.



100 X



1000 X

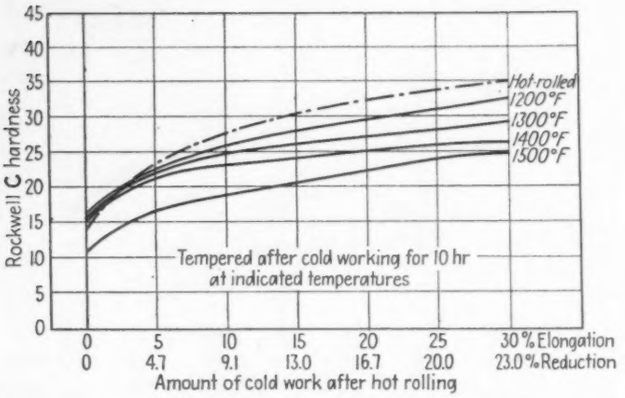


FIG. 28—Effect of cold work and subsequent temperings on the hardness of the alloy as hot rolled.

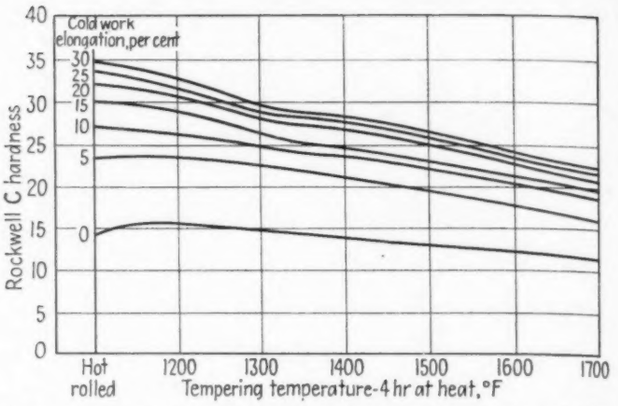


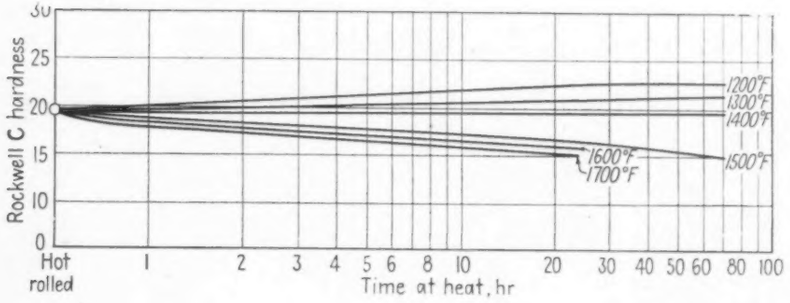
FIG. 29—Effect of 4 hr tempering at various temperatures on the hardness of hot-rolled and cold-worked 16-25-6-alloy.

from 1200° to 1500°F. This graph reveals that the hardness of the quenched material may substantially be increased by tempering without previous cold work. For the given tempering time of 10 hr, a maximum increase in hardness was obtained by tempering at 1400°F, which resulted in raising the hardness of the quenched alloy from 5 to 18 Rc. Tempering at 1200°F after cold working increases the hardness regardless of the amount of cold work given. With higher tempering temperatures, an equilibrium is reached at different amounts of cold work where the increase in hardness due to precipitation hardening is counterbalanced by the softening effect of stress relief and precipitate coagulation. For a tempering time of 10 hr, these points are shown as the intersections between the tempering curves and the curve of the as-quenched material.

Fig. 33 may again be used as a practical guide to determine the necessary amount of cold work and the allowable maximum tempering temperature—using 4 hr at heat—to assure a specified minimum hardness for material which previously had been subjected to a carbide solution treatment. It is interesting to note that the maximum hardness values for a given amount of cold work shift to lower tempering temperatures with increasing amounts of cold work.

The effect of tempering time upon the hardness of the solution-treated 16-25-6 alloy is shown in fig. 34. The importance of the time factor is clearly indicated. Hardness values of 20 Rc were reached after tempering for more than 100 hr at 1200°F, although the original hardness of 5 Rc persisted for the first 4 hr at this temperature.

Fig. 35 illustrates the effect of tempering time upon the hardness of the solution-treated alloy which had been cold-worked by 20 pct elongation. It appears significant that prolonged tempering at 1200°F or 1300°F does not appreciably affect the hardness of the cold-worked material. While a noticeable decrease in hardness resulted from long time tempers at 1400°F and 1500°F, the softening process seems to be arrested after approximately 20 hr at these temperatures.



o o o

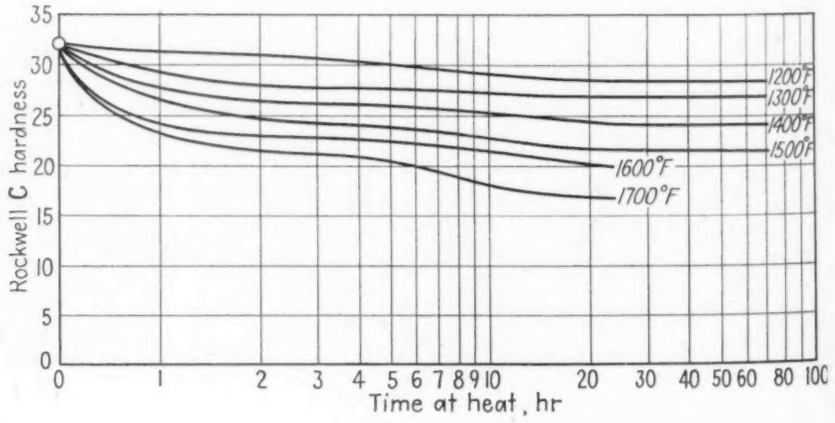
FIG. 30 — Effect of tempering temperature and time upon the hardness of the hot-rolled alloy.

o o o

o o o

FIG. 31 — Effect of tempering temperature and time upon the hardness of hot-rolled and cold-worked (20 pct elongation) 16-25-6 alloy.

o o o



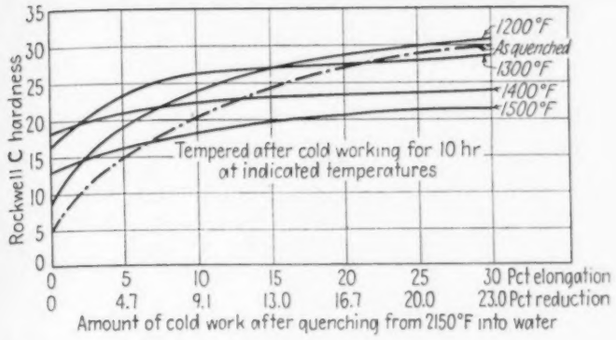


FIG. 32—Effect of cold work and subsequent tempering upon the hardness of solution-quenched 16-25-6 alloy.

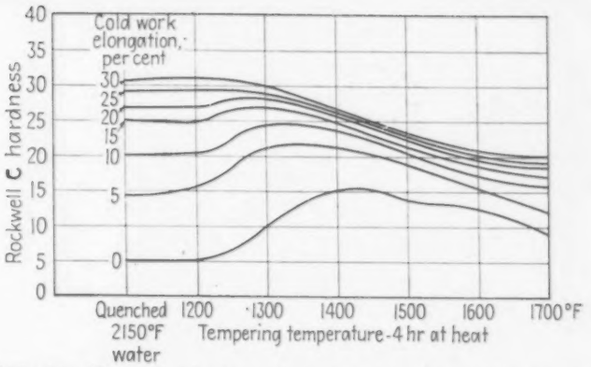


FIG. 33—Effect of 4-hr tempering at various temperatures upon the hardness of solution-quenched and cold-worked alloy.

Above 1500°F, the cold-worked alloy will gradually lose hardness with time at temperature, indicating overaging.

Longitudinal specimens were prepared from the samples which had been cold-worked by 20 pct elongation and tempered for 72 hr at increasing temperatures from 1200° to 1500°F. Figs. 36 to 39 reveal the structures observed for the hot-rolled material at 100 and 1000 magnifications. These structures are characterized by the fine grain size of the austenite and the presence of an appreciable amount of precipitate. The pronounced banding is typical for any high nickel alloy steel, pointing to dendritic segregation as its origin. With increasing tempering temperature a precipitate appears in the austenite grains which is found coagulated into spheroids after 72 hr at 1500°F, as shown in fig. 39.

The solution-treated material quenched from 2150°F in water is shown in figs. 40 to 43. Here the austenite grains are large enough to reveal the effect of cold work in the distortion of the originally straight line twinning. The precipitation phenomenon is indicated by a darkening of the austenite grains which progresses with increasing tempering temperature to an apparent roughening of the polished and etched surface. A comparison of fig. 39 with fig. 43 shows an outstanding difference in structure. Both samples were tempered for 72 hr at 1500°F. Their hardness is practically identical because of a balance between grain size and particle size. The large coagulated particles in fig. 39 indicate overaging while the extremely fine particles precipitated uniformly from the solution-treated coarser grained material in fig. 41 reveal that the 1500°F temper in this case is still in the precipitation hardening range. These photomicrographs indicate that the solution-treated material should possess higher creep strength at elevated temperatures, especially above 1400°F.

High-Temperature Properties

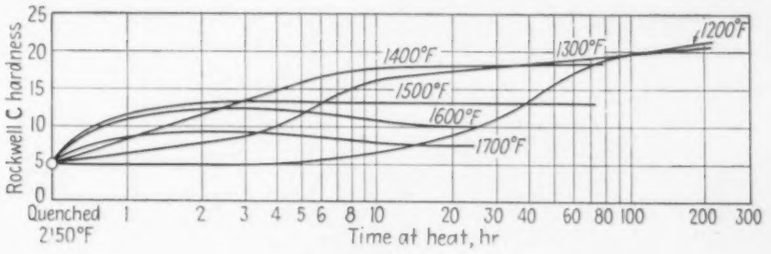
The ready response to cold work as well as the precipitation hardening characteristics which have been shown to markedly influence the room temperature properties of the 16-25-6 alloy also affect its high temperature physical properties.

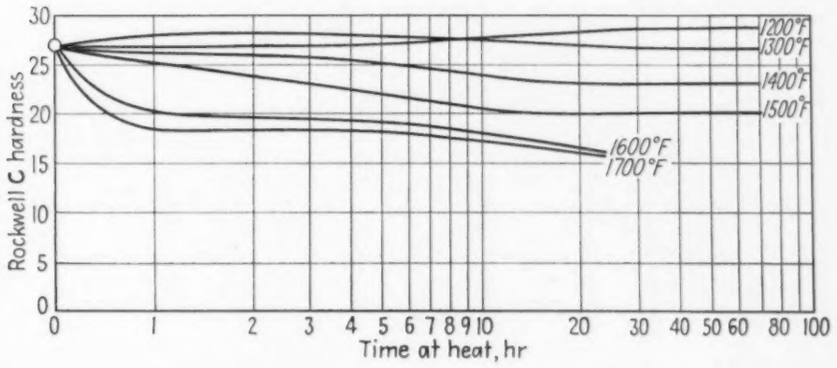
Fig. 44 illustrates the short time tensile values of hot-rolled as well as solution-quenched material at temperatures up to 1700°F. These graphs indicate that the hot-rolled alloy possesses superior strength values at least up to 1450°F. It appears significant that a pronounced dip in the ductility curves of the solution-quenched material occurs at 1300°F which

(*Continued on Page* 58)

RIGHT

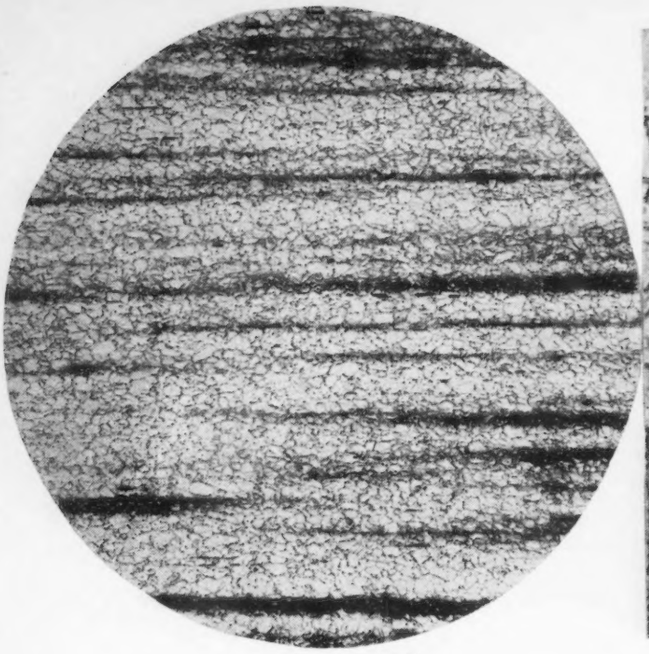
FIG. 34 — Effect of tempering temperature and time upon the hardness of the alloy quenched from 2150°F into water.



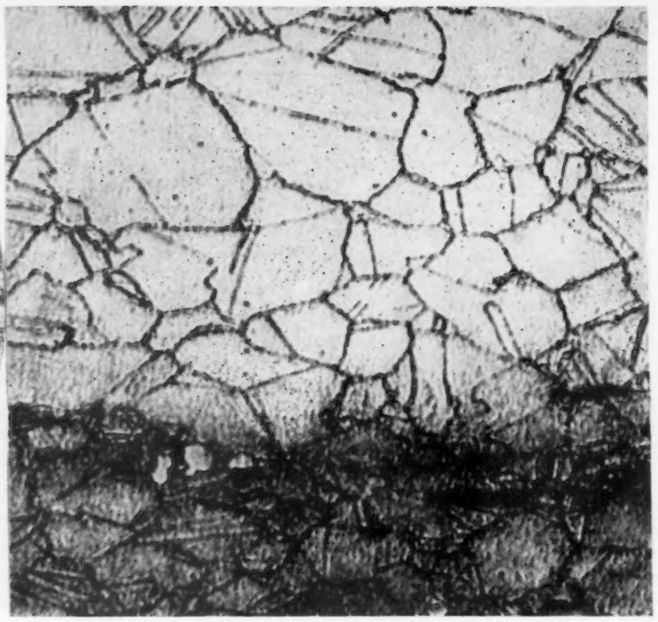


LEFT

FIG. 35 — Effect of tempering temperature and time upon the hardness of quenched and cold-worked (20 pct elongation) 16-25-6 alloy.

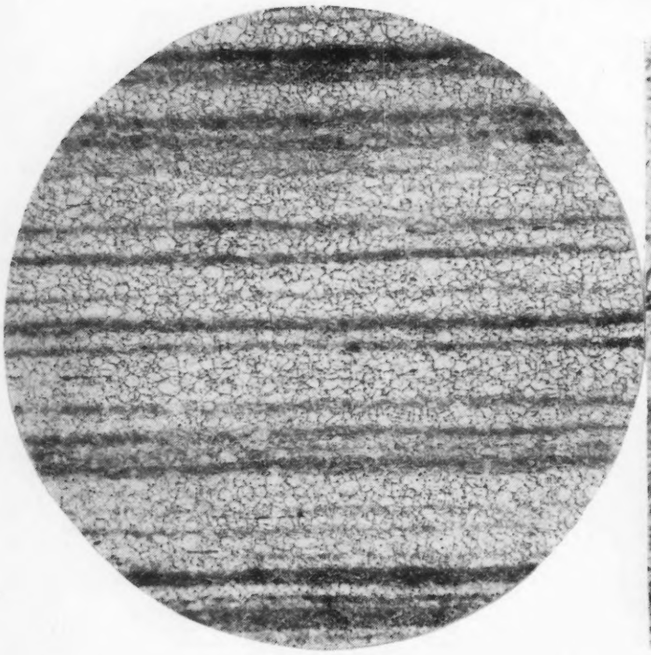


100 X

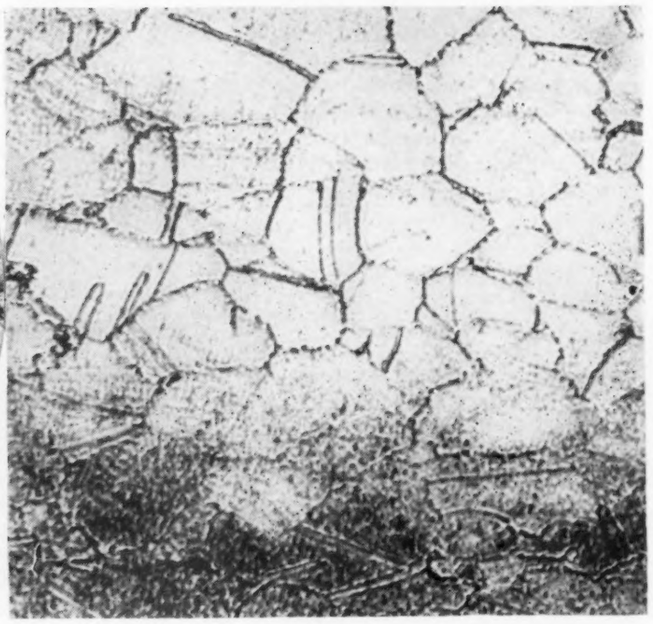


1000 X

FIG. 36 — H
rolled, cold-wo
by 20 pct elo
tion, and temp
at 1200°F for 7

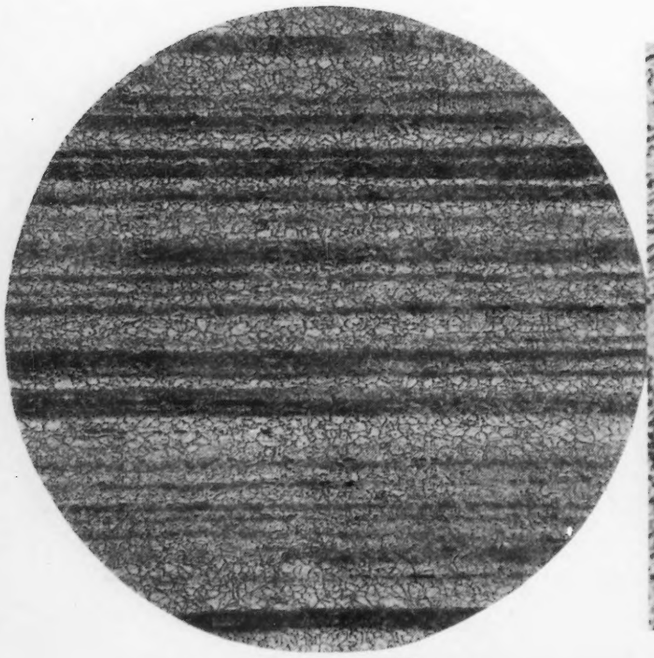


100 X



1000 X

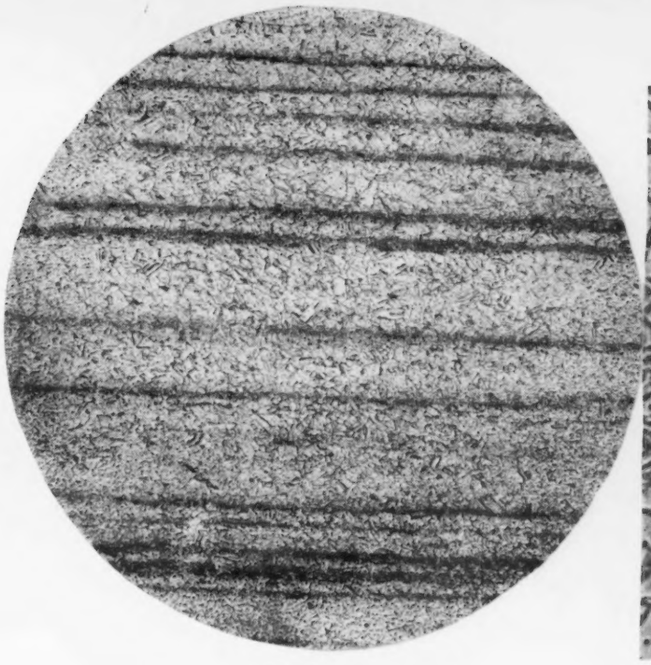
FIG. 37 — H
rolled, cold-work
by 20 pct elong
tion, and temper
at 1300°F for 72



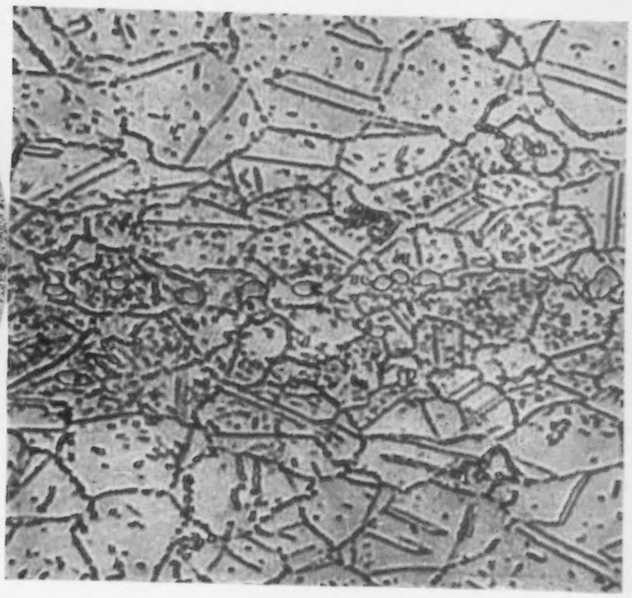
100 X

1000 X

FIG. 38 — H
rolled, cold-work
(20 pct elongation
and tempered
1400°F for 72

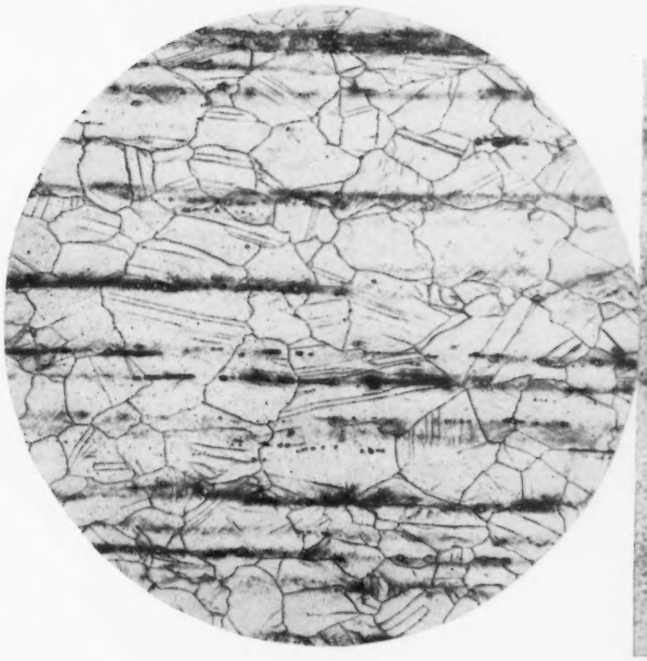


100 X

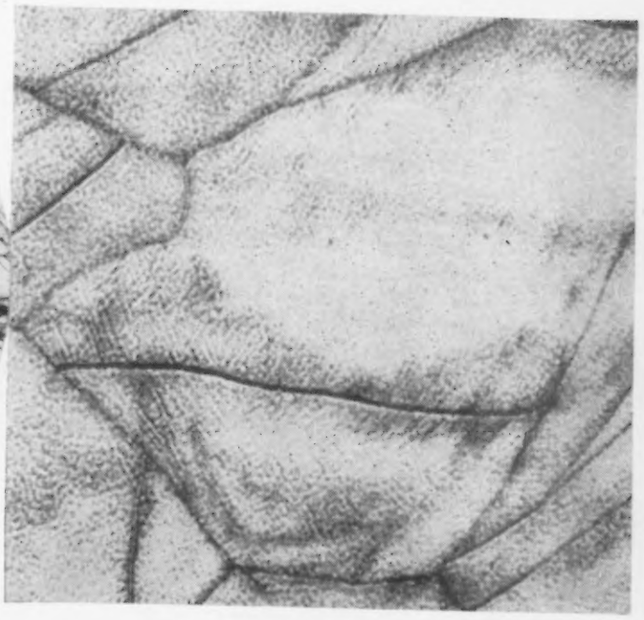


1000 X

FIG. 39 — Hot-rolled, cold-worked by 20 pct elongation, and tempered at 1500°F for 72 hr.

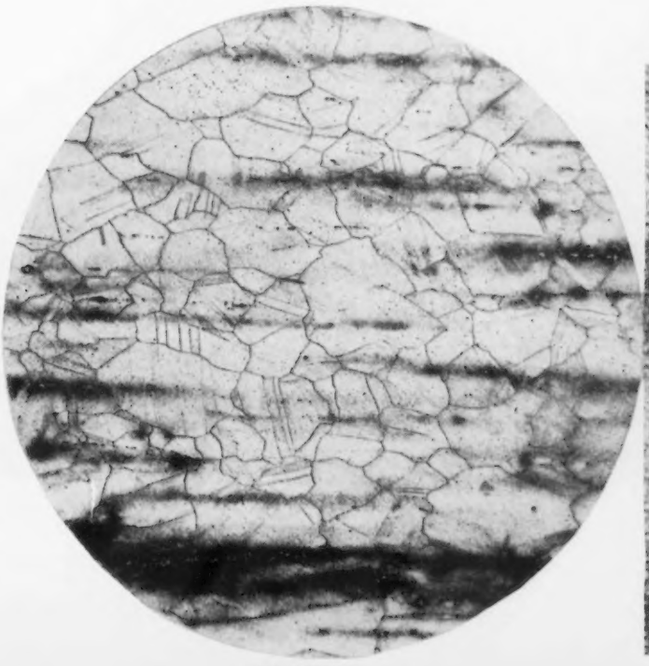


100 X

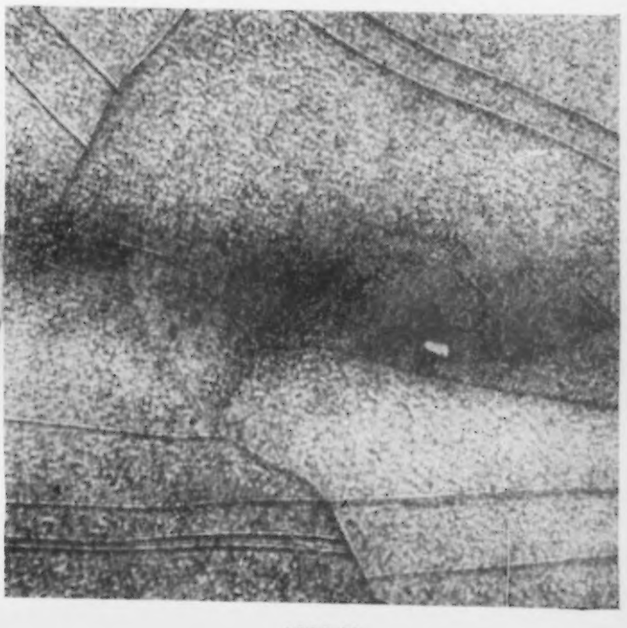


1000 X

FIG. 40—Solution-quenched, cold-worked by 20 pct elongation, and tempered at 1200°F for 72 hr.

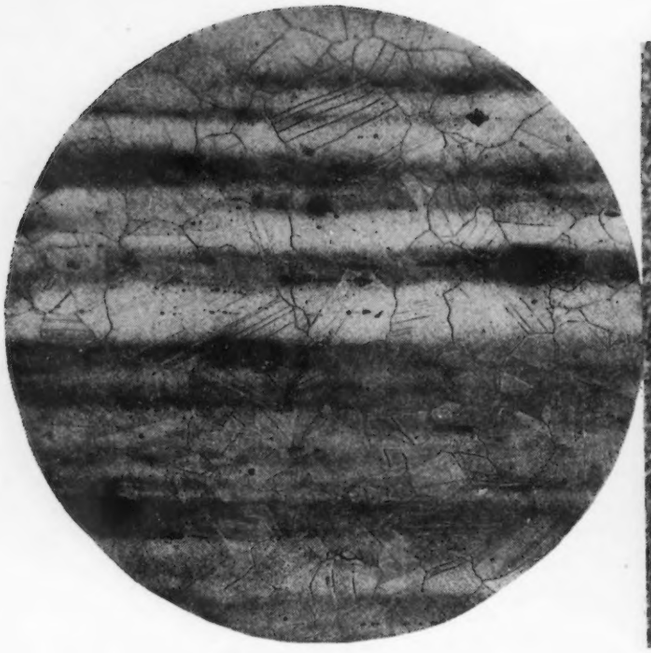


100 X

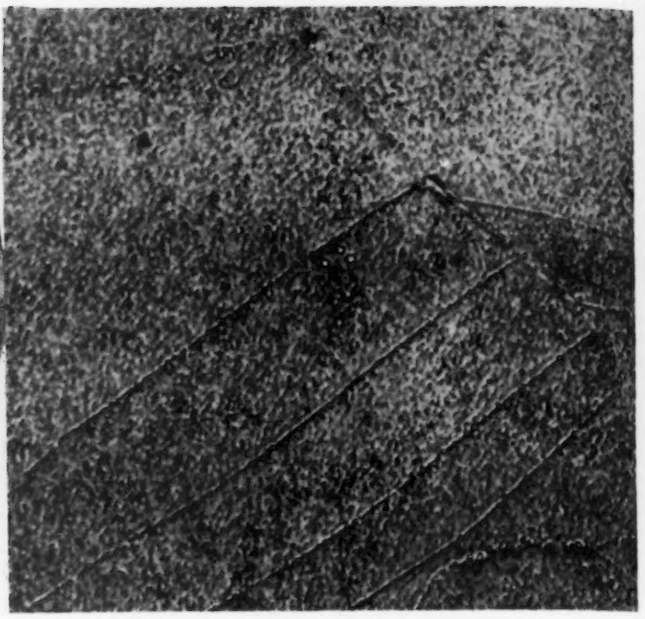


1000 X

FIG. 41—Solution-quenched, cold-worked by 20 pct elongation, and tempered at 1300°F for 72 hr.



100 X



1000 X

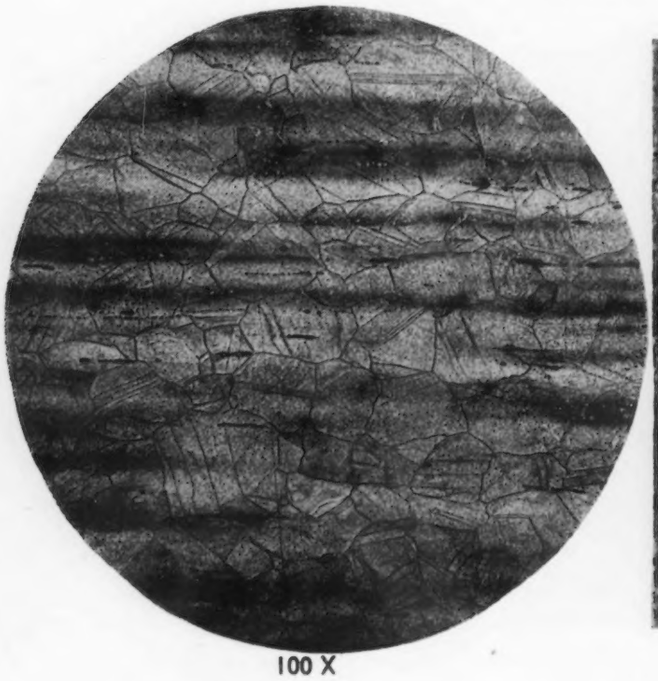
FIG. 42—Solution-quenched, cold-worked by 20 pct elongation, and tempered at 1400°F for 72 hr.

could not be observed for the alloy in the as rolled condition. Precipitation hardening explains this phenomenon.

The short time tensile values of the cold-worked alloy are shown in fig. 45. Up to temperatures of 1450°F the cold work imparted a marked increase to the proportional limit, yield strength and tensile strength of the material. The solution-quenched alloy appears superior in these strength values compared to the hot-rolled material although the difference is of small magnitude. However, the bars solution quenched previous to cold work lack the high ductility values associated with the as rolled material.

Stress-rupture curves for the 16-25-6 alloy are shown in fig. 46. This graph also gives a comparison with the austenitic 18-8 steel and the pearlitic Sicromo 5-S composition. This latter steel, containing 5 pct chromium, 0.50 pct molybdenum and 1.50 pct silicon, was developed years ago by the Timken Roller Bearing Co. and has proved its value, especially in the oil refining industry. The graph indicates, for instance, that a load of 6000 psi at 1500°F would cause rupture of

FIG. 43—Solution-quenched, cold-worked by 20 pct elongation, and tempered at 1500°F for 72 hr.



100 X

1000 X

the Sicromo 5-S steel in 12 min while this load could be carried by the 18-8 composition for 100 hr. The 16-25-6 alloy would live under the same stress for more than a year. These curves represent solution-quenched or annealed material, but tests have indicated that, at least, for long rupture times at temperatures above 1200°F, little if any benefit may be gained in the rupture strength of the 16-25-6 alloy by previous cold working or precipitation hardening.

The rate of creep at elevated temperatures on the other hand is materially affected by previous treatment and the resulting microstructure. In general, it may be stated that precipitation hardening lowers the rate of creep and a similar effect may be produced by cold working for testing temperatures at least up to 1300°F. Creep strength, therefore, is a most sensitive property and the designer should base his high temperature strength calculations mainly on stress-rupture data. As a guide, however, creep strength curves are shown in fig. 47, comparing the values for the 16-25-6 alloy with the creep curve of the standard 18-8 steel at 1400°F.

The results of rotating-beam fatigue tests at elevated temperatures indicate excellent fatigue resistance of the material. In fact the fatigue strength of the 16-25-6 alloy exceeds its stress-rupture strength for time periods of 10,000 hr.

There are other data required by the engineer in his stress calculations. The modulus of elasticity as determined from stress-strain curves obtained at room and elevated temperatures may be taken from the following tabulation:

Temperature, °F	Forged, Cold-Worked, and Tempered 4 hr at 1250°F	Quenched, 2150°F, Cold-Worked, Tempered 4 hr at 1250°F
Room temp.	28.2×10^6	32.5×10^6
1200	17.9×10^6	17.9×10^6
1300	14.0×10^6	14.9×10^6
1400	11.3×10^6	14.2×10^6
1500	10.0×10^6	13.8×10^6

The modulus of rigidity was found to be 11,000,000 psi and Poisson's ratio was determined as 0.286 for test pieces cut from supercharger wheel forgings.

Thermal expansion plays an important role in the design of high temperature machinery. The coefficient of expansion of the 16-25-6 alloy, therefore, was determined and may be taken from the following table:

Temperature Range, °F	Coefficient, In. Per In. Per °F
70 to 200	8.4×10^{-6}
70 to 400	8.7×10^{-6}
70 to 600	8.85×10^{-6}
70 to 800	9.05×10^{-6}
70 to 1000	9.2×10^{-6}
70 to 1200	9.4×10^{-6}
70 to 1400	9.5×10^{-6}

During the past 4 yr more than 12,000,000 lb of the 16-25-6 alloy have been shipped. This material was furnished in various forms; as ingots to be forged into large gas turbine wheels, in 8½-in. square blooms to be hammered into jet engine turbine wheels, in flats and round bars for application in turbine blading. However, its largest use was found in the mass pro-

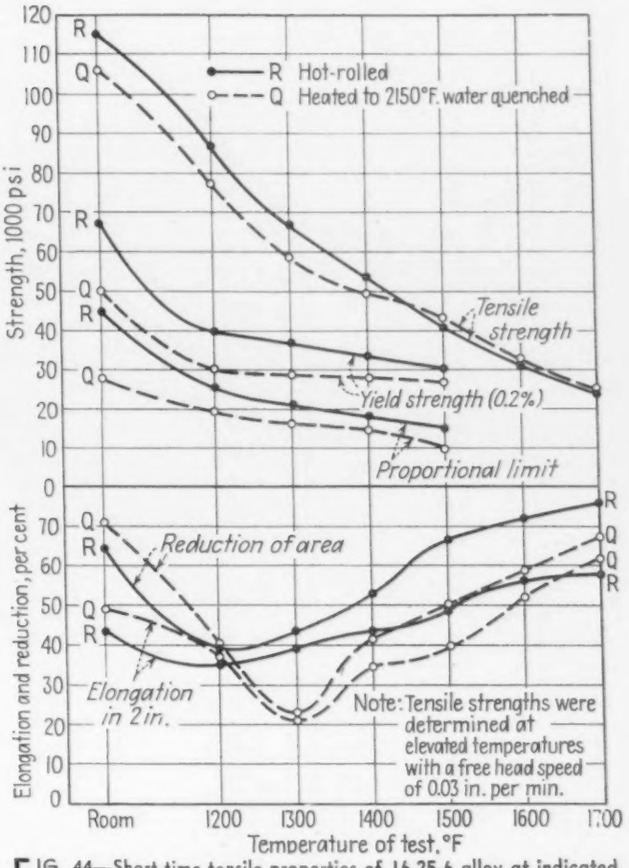


FIG. 44—Short-time tensile properties of 16-25-6 alloy at indicated temperatures, 1-in. round bars.

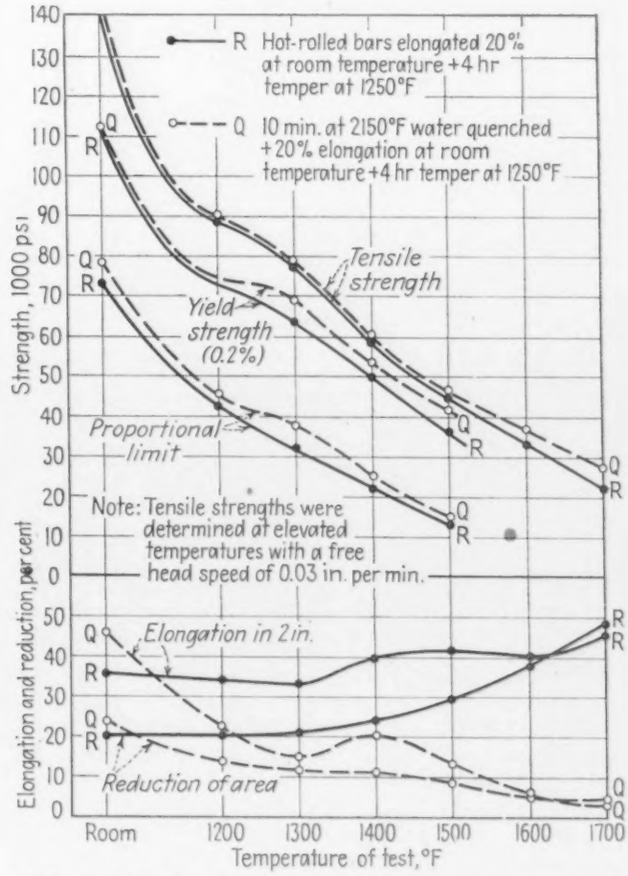


FIG. 45—Short time tensile properties of cold-worked 16-25-6 alloy at indicated temperatures, 1¼-in. round bars.

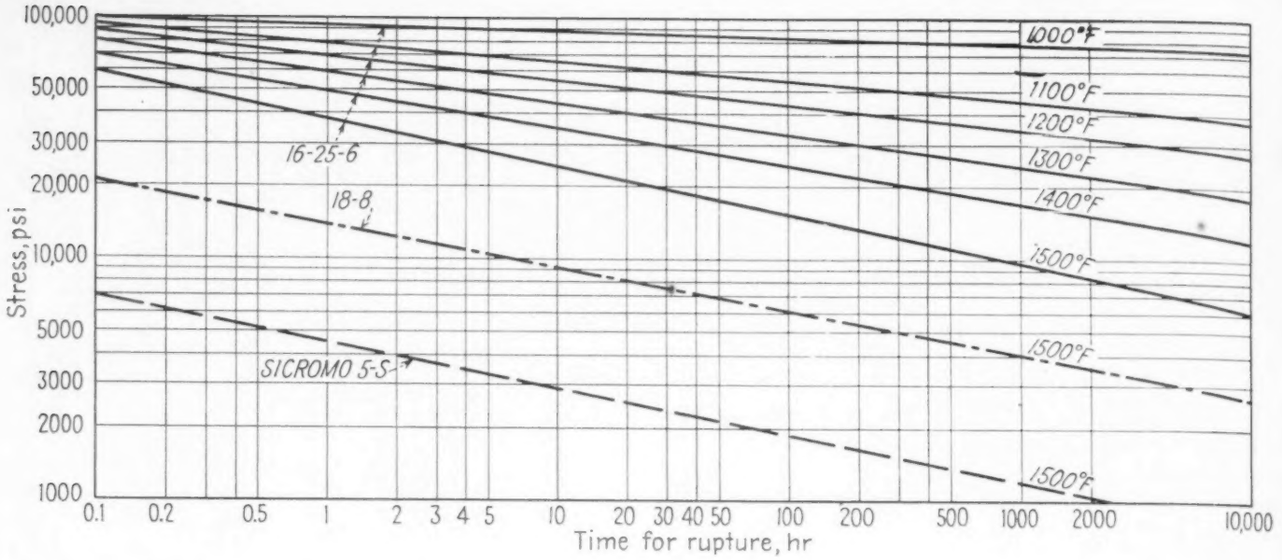


FIG. 46—Stress-rupture curves for 16-25-6 alloy in comparison with austenitic 18-8 and pearlitic Sicromo 5-S steels at 1500°F.

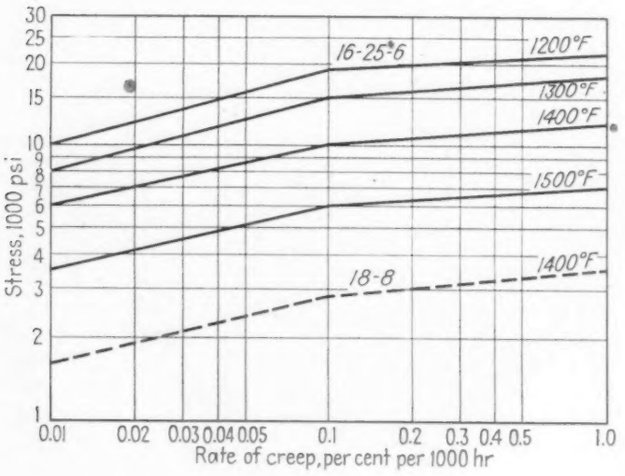
duction of the General Electric turbosupercharger. Hundreds of thousands of turbosupercharger wheels were produced from 4-in. square billets of the 16-25-6 alloy during the war and, as far as it is known, not a single wheel made of this alloy ever failed in service. Much of the credit for this remarkable record is due to the metallurgical department of the General Electric Co. which issued the specifications and in continuous production testing assured the high quality of the final product.

The forging of the supercharger as well as the jet turbine wheels requires two distinct steps of operation; (1) Hot working and (2) cold working. As was pointed out previously, high yield-strength values may most readily be imparted to the material by cold working. This strength will be retained to a large extent during the limited service life at elevated temperatures. The forging procedure consists of upsetting a definite length of the billet or bloom at 2000°F max into a blocking die. The design of this blocking die is of utmost importance as the shape of the blocked forging fixes the amount and distribution of cold reduction, which may finally be taken in the finishing die, and simultaneously determines the uniformity of hardness throughout the final section. The cold working usually is conducted at temperatures of 1200° to 1400°F in order to reduce the stress on dies and hammer. Nevertheless, large drop-forging hammers are desirable for cold working. The largest hammers in the country, of 35,000 lb capacity, have been used in the production of jet turbine wheels. Only recently one of these hammers was rebuilt to 47,500 lb capacity in order to take care of even larger forgings. After cold working, the forgings are tempered at 1200° to 1250°F in order to relieve the very high stresses set up in the cold working operation.

Typical tensile test values obtained from samples cut from supercharger wheel forgings are indicated in the following properties:

Test Temperature, °F	Yield Strength, (0.02 Pct) Psi	Ultimate Strength, Psi	Elongation, Pct	Reduction of Area, Pct
Room	90,000 to 115,000	125,000 to 150,000	10 to 20	10 to 30
1500	.....	55,000 to 65,000	15 to 30	15 to 40

FIG. 47—Creep curves for 16-25-6 alloy compared with austenitic 18-8 steel at 1400°F.



The demand for a material suitable for gas turbine applications gave the impetus to the development of the 16-25-6 alloy. There can hardly be any doubt now that there is a bright future for this new engine, either as a prime mover or in combination with other power units. However, there are many other applications where this alloy may serve and prove its value. From high temperature bolting to intricate parts used at high stress at elevated temperatures, many applications for an alloy possessing combinations of properties similar to the 16-25-6 alloy may be found.

Still better compositions will be developed in the future, especially if no restrictions are placed upon the type and quantity of alloys which have been of strategic importance and, therefore, limited for mass production.

Brazed Sheet-Metal Automobile Engine

o o o

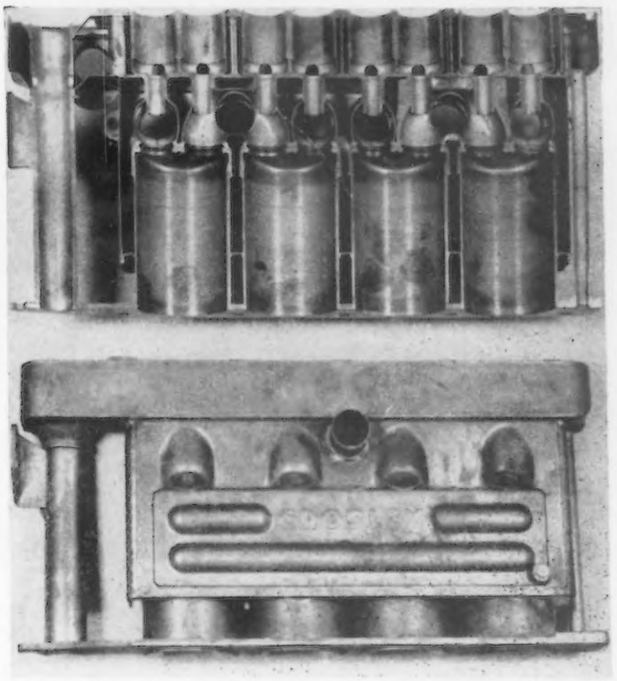


FIG. 1—Cross-section through Crosley cylinder block showing the arrangement of the various tubular and sheet metal parts, and, below, a view of the left-hand side.

MAKING a completely new approach to engine design, Crosley Motors, Inc., Cincinnati, have revealed construction details of their new, furnace brazed, all sheet-steel engine. Developed in Cincinnati by Crosley engineers under the direction of Paul Klotsch, Chief Engineer, with the aid of Lloyd Taylor, it is being produced primarily for use in the new Crosley automobile; Crosley holding exclusive rights under all patents and to all developments of Taylor Engines, Inc., of California.

Well past the experimental stage, this four-cylinder, high-speed unit has been employed for some time in motor generator sets supplied to the Navy for use in P-T boats, and for furnishing electrical power for the gun turrets of amphibious landing tanks. In addition, it has been used by the Air Corps as a portable, self-contained power unit for starting the engines of heavy bombers. Thus, when the new car comes on the market, the engine will be unlikely to develop the usual bugs, since in addition to its service use, it has successfully passed government tests requiring 100-hr operation at full throttle.

These first engines had a compression ratio of 9:1 and were designed to operate on 100 Octane aviation fuel. This is impractical for commercial use at the present time and these engines are not in production for automobile use. The new engine now in use has a bore of 2½ in., and a stroke of 2¼ in., giving a displacement for the four cylinders of 44 cu in. At full rated power of 26 hp, the crankshaft turns up 5200 rpm, and has been run on the dynamometer at 6000 rpm without any injurious effects and without noticeable vibration or temperature rise. In general, conventional automobile practice is followed as regards fits, finishes, bearings, pressure lubrication, and so forth. The five bearing overhead camshaft is driven by bevel gears from the crankshaft, the drive shaft being used to carry the oil under pressure to the bearings, and the oil pump and distributor are driven by helical spur gears from the crankshaft.

The outstanding feature of the engine, however, is the construction of the cylinder block which is made up of light-walled alloy steel tubing for the cylinders and cam follower guides, and of sheet-steel stampings for the cylinder heads, intake and exhaust ports, valve cases, and water jackets. In making the barrels, SAE 4140 tubing is turned, bored, chamfered, and cut off on Cone automatics, the only machining operation performed on the part except for grinding after assembly. Cam follower guides are machined from 4140 steel tubing, and valve seats are machined from a special chrome-tungsten-vanadium alloy.

All other parts of the block, about 120 individual pieces, are stamped from SAE 1010 deep-drawing steel. The base is stamped from ¼-in. thick material, the heaviest piece of the block, and all holes, including cylinder barrel openings, hold down stud holes, and holes for the camshaft drive shaft housing and oil return tube, are punched sufficiently close to size that no additional reaming is required. The individual cylinder heads are cup-shaped stampings with holes for the spark plug inserts and for the intake and exhaust elbows. These latter are made in two pieces and are crimped together for temporary positioning prior to brazing.

The various elements are made to fit snugly into one another so that as assembly progresses the block may be handled without danger of its falling apart, although some parts, such as the main water jacket, are spot welded in two or three places to assure close contact between the jointing surfaces. Where screws will be required to enter the block, as at the intake and exhaust manifold flanges, for the attachment of the fuel pump, and for the aluminum camshaft bearings,

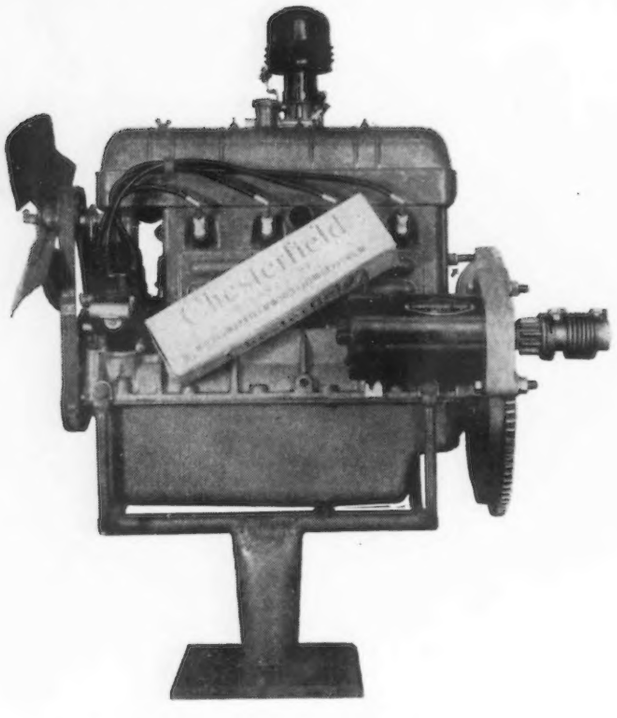


FIG. 2—An impression of the small size of the engine can be had by this comparison with a standard cigarette carton. In this condition, ready for installation, the engine weighs only 121 lb.

an ingenious type of bushing is employed. This is in the form of a piece of heavy wall tubing, finish tapped to the desired size, and then bored out at each end for a short distance to leave a thin wall. These bushings are inserted at the appropriate places, and the ends spun over so that they act as hollow rivets holding the parts firmly in place.

As assembly progresses brazing copper is applied at all joints in a form dictated by the joint condition. Thus, where the joint is small, and only a minute amount of copper is needed, copper paint is employed, whereas for larger joints, copper wire or foil is inserted or wrapped around. No flux is employed as the clean metal surfaces and capillary attraction are sufficient to assure adequate diffusion of the copper into all joint surfaces.

Completed assemblies are then placed in trays, four units to a tray, and fed into a specially designed, continuous conveyor type, electrically heated, neutral atmosphere, Lindberg brazing furnace. Flame curtains at each end prevent the entry of air when the doors are opened, and parts are perfectly clean and free of scale when they leave the furnace. The furnace itself is 60 ft long, and comprises a preheating zone where the blocks are slowly brought to temperature, a brazing chamber where brazing takes place at 2060°F, and fast and normal cooling zones. At a certain point in the cooling chamber, where the block has been cooled from 2060°F to about 1500°F, the cool neutral atmosphere is introduced into the furnace and allowed to circulate around the assemblies which are thereby quickly cooled to about 1100°F. This is in effect a quenching operation which serves to harden the cylinder walls, cam follower guides and valve seats. Barrels and guides thus attain a hardness of 280 Bhn, and valve seats about 450 Bhn. Normal production at the present time is about 28 blocks an hr.

Immediately after brazing, assemblies are hydraulically tested for leaks, and, if necessary, minor repairs are made by silver soldering. Major leaks are fortunately very rare, but if they do occur, no attempt is made to repair them, the block being scrapped in the interests of both quality and production efficiency. Blocks then proceed to the final machining operations which consist of taking a light cut off the bottom of the base plate, the camshaft bearing supports and the flange faces, and boring and honing the cylinder bores. These cuts are only sufficient to remove the rivet heads mentioned earlier, and to clean up jointing surfaces, and the amount of metal removed amounts to only about one half pound. Cylinders are bored on a special four-head Bore-Matics with carbide tipped tools, thus assuring perfect alinement and correcting any warpage which may have occurred in the furnace. This warpage, however, is surprisingly small, amounting to not more than 1/64 in. total in 16 in. as shown by repeated checks. This can be attributed to careful design of the stampings as to the height of extrusions, control of press fits, and strict attention to the rate of preheat and cooling in the furnace. A light honing completes the cylinder operations to produce a surface finish of approximately 60 m in. rms. Cam follower guides are similarly bored and honed except that two four-spindle machines are employed because of the closeness of the center distances.

The entire block is now Bonderized for rust prevention and to improve paint adhesion, and all inside surfaces which will be in contact with the cooling water are coated with a special Ault and Wiborg area formaldehyde lacquer by pumping this through the jacket. This is baked at 350°F and forms a hard, tough surface which cannot be removed by either acid or strong caustic solutions, and which guarantees the interior surfaces against corrosion. This is particularly important in the case of the jacket which is made from 20 gage steel and, if unprotected, would rust away very rapidly. Its light weight, however, does not detract from its strength which is assured by adequate ribbing, and tests have been run by filling this with water and freezing solid at 40°F below zero. No cracking of either joints or parent metal has been detected in these tests. Complete and ready for assembly in the engine, the block weighs only 14 lb.

The crankcase is a permanent-mold, aluminum-alloy casting requiring very little machining except on the top and bottom faces for attachment of the cylinder block and oil pan, and the five main bearings. It is only 3-in. high, and weighs 7¾ lb after machining. Bearings are of the precision replaceable type, requiring no machining in assembly, and the rear one is flanged to take the crankshaft thrust. Cylinder hold-down bolts extend through the case to the main bearing caps.

The crankshaft is a centrifugal casting machined by conventional methods, induction hardened on the journals, and carefully balanced to within ¼ in. oz. Some experimental shafts were made of stamped cheeks assembled with tubular sections for shaft and crankpins, the whole being brazed into a unit. These worked well, but the cost of fabrication was substantially higher than that of a cast shaft, and they were, therefore, abandoned. The use of a five bearing shaft,

unusual in a four-cylinder engine, not only makes for a more rigid shaft, but, by eliminating the necessity for an extra large center bearing, results in a reduction in overall length of about 1 in. Vibratory stresses are said not to exceed 4000 psi, but torsional deflection tests of 12,000,000 cycles, stressing the shaft to 6000 psi, have been made without inducing failure.

The camshaft is forged, and drilled full length for pressure lubrication of the bearings. The cams actuate hardened and ground valve lifters which are made from alloy steel tubing closed at one end by a disk furnace-brazed into place. Originally these parts were machined from bar stock, but the brazed construction has been found to work equally well and to be much cheaper. Valves have 21-12 chrome-nickle steel heads with stems of SAE 3140 steel, flame hardened at the tips. Pistons are permanent-mold aluminum-alloy castings, heat treated. The skirts are cam ground, and the entire piston, including the cast-iron rings, is anodized. Piston pins are full floating, with aluminum end plugs.

The crankcase has a capacity of 3 qt of oil, and this is filled through an opening in the top of the valve cover from where it flows into the case through the camshaft drive shaft housing. The valve cover and lower pan are sheet-steel stampings, and the crankshaft pulley, fan assembly and fan pulley, as well as the water pump impeller and pulley are all made up from copper brazed stampings.

As used in the new Crosley car which is due to appear on the market in February, the engine will have a compression ratio of 7.5:1, and will develop 26 hp at 5200 rpm. The weight of the bare engine is only 58 lb, or with flywheel and front and rear bell housing, 79 lb. Complete with all accessories, including generator and starter, the weight is 121 lb, and as installed in the car with radiator, oil and 5 qt of water or antifreeze, 151.5 lb. Five quarts of water would not appear to be very much, but the pump circulates this at the rate of 12 gpm and no overheating has been experienced. It is claimed that with standard high test gasoline of 80 octane, detonation will not occur at any speed because of the cool combustion chamber. Maximum thickness of metal at any point separating the combustion chamber from the coolant is only ⅛ in. Because of the uniform substantially thin walls of the fabricated construction, including the portion between the valve seat inserts, and because of the generous contact between these walls and the cooling medium, a much more even distribution of heat is obtained. This prevents the accumulation of heat in certain areas, avoids hot spots, eliminates pre-ignition, and allows the high compression ratio to be used successfully.

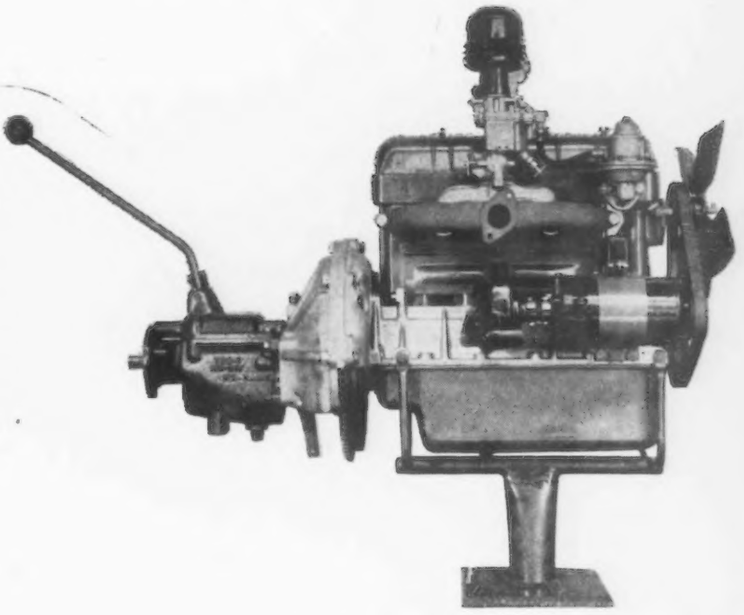
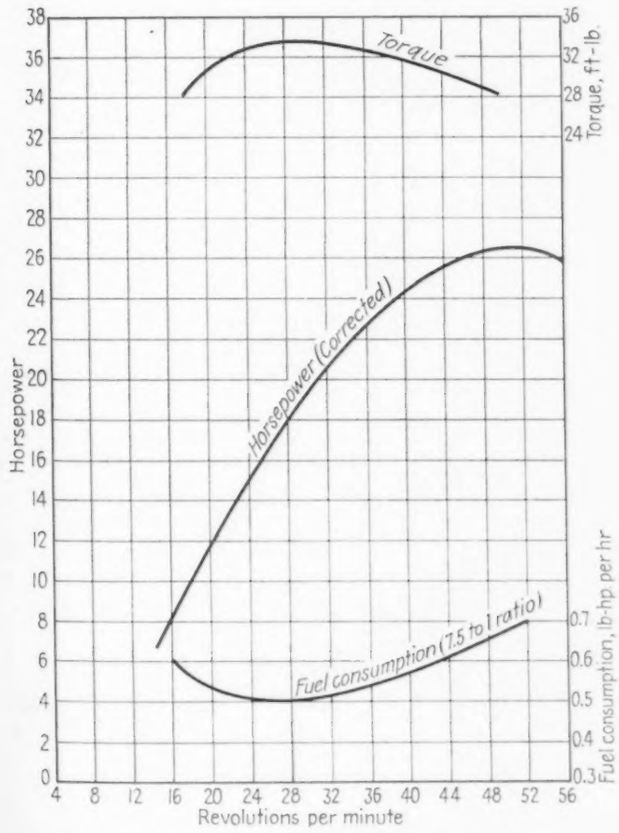


FIG. 4—Right hand side of the engine with transmission attached. The easy accessibility of all accessories is clearly shown.

FIG. 3—Chart showing horsepower, torque, and specific fuel consumption of the Crosley sheet-steel engine.



Very little information is available concerning the new car itself, except that it is to weigh 1000 lb and carry four persons, and while necessarily quite small in size, will be of pleasing modern design, and will have a top speed of 65 mph. In tests made with a 1200-lb test car with a 350-lb payload, the new engine has given 50 miles per gal at a speed of 30 mph, and 35 miles at 55 mph. At maximum torque, the specific fuel consumption is 0.48 lb per hp-hr. Bodies will be made by Crosley, and the car will be assembled at the new Crosley plant at Marion, Ind.

In addition to its use in the new car, the engine is available for marine use, farm machinery, refrigerator and air conditioning equipment, motor generators, oil pumps, and auxiliary power plants.

Effect of Work Position In Face Milling

By FRED W. LUCHT
Development Engineer
Carboloy Co., Inc., Detroit

o o o

ALL of the work that has been done and all of the observations which have been made to date on the subject of face milling steel with carbide cutters have indicated clearly that the longest cutter life is obtained when (1) the cutters have double negative rake angles, and (2) the full depth of cut is taken along some definite corner angle.[1]

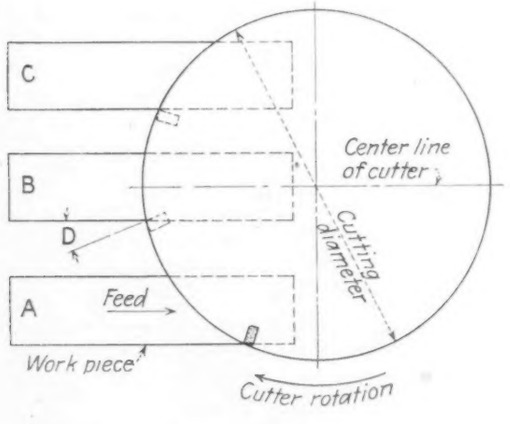
There are certain operating conditions in every steel milling setup which should at all times be maintained as nearly ideal as possible. These objectives are design, manufacture and sharpening of the cutter; power capacity, feed and speed of the machine; and a flywheel to smooth out the roughness resulting from the necessarily coarser tooth cutters removing stock at increased table travel. But even after all this has been done, the cutter performance and the number of pieces obtained per cutter grind still will show noticeable variations as the work position is shifted at right angles to the direction of feed of the work past the cutter.

Until recently, not much thought has been given to the positioning of the work in relation to the cutter, and only in limited cases has any consideration been given to the fact that the radial engagement angle D (fig. 1), between the face of the tooth and the edge of the work where the cutting edge enters it, should be negative. It is interesting to note that when this angle has been negative, the number of pieces per grind has been more consistent than when no attention at all was paid to it, even though the cutter may not have produced its maximum number of work pieces per grind.

[1] *For further information on milling with carbides, on both ferrous and nonferrous metals, see* THE IRON AGE *issues of Mar.* 16, *May* 11, *May* 18, *June* 22, *June* 29, *Dec.* 14, 1944, *and Oct.* 14, 1945.

It has also been found that a face milling cutter usually gives a smooth cutting action together with the maximum number of pieces per grind when the work piece is positioned about as shown at B. Position C generally rates second as to the number of pieces per grind, with quite consistent results. Position A rates third, with somewhat erratic results. This difference in results has been noticed for years while observing the face milling of steel with high speed steel cutters, but it has become more prominent when milling steel with carbides.

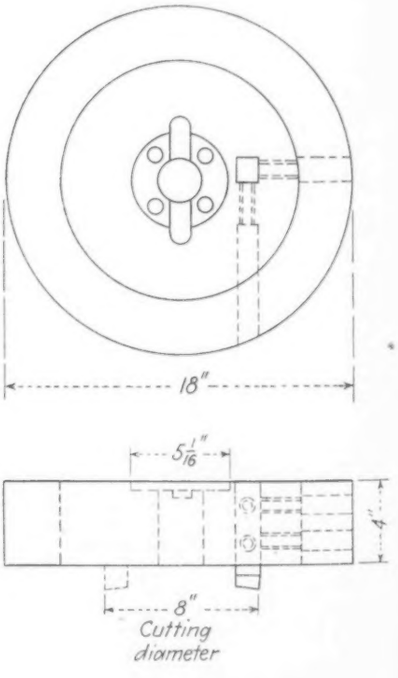
Milling operations are frequently found where the diameter of the face mill is too small to permit the proper positioning of the work to a setting which gives



LEFT

FIG. 1—The angle between the face of the tooth and the edge of the work at the point of entry, has a profound effect on tool life.

o o o



RIGHT

FIG. 2—The cutter used for the tests incorporated a flywheel to eliminate vibration.

Much experimental work has been done on the face milling of steel with carbide cutters with a view to establishing optimum cutter design, and rates of feed and speed. Little attention, however, has been paid to the extent to which tool life is affected by the variations of the work position in relation to the direction of feed. In the first section of this two part article, originally presented at the Fall meeting of the ASME in Cincinnati, the author describes in detail the careful procedure employed for determining the effects of varying work positions upon tool life. Reprinted with corrections from the Dec. 6, 1945 issue of The Iron Age.

longest cutter life. Under such a condition, there seems to be no definite means available which will assist in determining the diameter of a face mill that would produce the maximum number of pieces per grind.

This problem of determining optimum cutter diameter for a given face milling job and the proper positioning of the work piece in relation to the cutter resulted in the investigations described below.

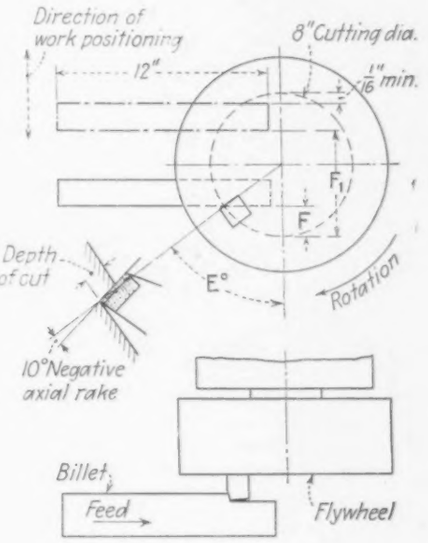
A No. 5-HM vertical milling machine was used, with 20 hp available for the main spindle, and 5 hp for the feed and rapid traverse. Wattmeter readings indicated 30 kw on the main spindle, and 12 kw on the feed and traverse. The cutter, fig. 2, was a single-tooth, face milling type, 8 in. in diam, and enshrouded with an 18-in. diam by 4-in. thick steel flywheel. The tool bit slot was parallel to the axis, and the tool bit was clamped in place by set screws. The combined weight of the cutter-head-flywheel-tool unit was 255 lb. A total of twelve tool bits was used for the tests, and these were tipped with Carboloy Grade 78B, a general steel milling grade, ground as shown in fig. 3. Forged steel billets 1½ x 3 x 12 in., of SAE 1045 steel heat treated and drawn to 190 to 200 Bhn, served for all face milling tests. These were held rigidly in a plain vise in relation to the cutter as shown in fig. 4.

The cutter was run at 238 rpm (498sfpm), previous tests having indicated that this speed gave the longest tool life on the particular material in use, and the

o o o

RIGHT

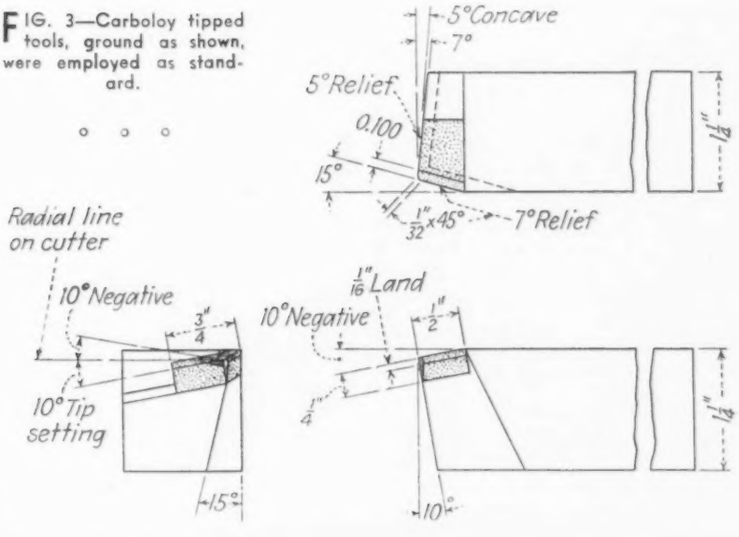
FIG. 4—Setup of cutter and work, and table showing the various work positions used.



o o o

FIG. 3—Carboloy tipped tools, ground as shown, were employed as standard.

o o o



WORK POSITION	
ANGULAR POSITION E (Degrees)	DISTANCE F (Inches)
10	.061
20	.241
30	.536
35	.723
40	.936
45	1.169
50	1.429
55	1.706
60	2.000
65	2.310
70	2.632
75	2.965
80	3.305
90	4.000
95	4.349
100	4.695
105	5.035
110	5.368
120	6.000
127°-33'	6.437

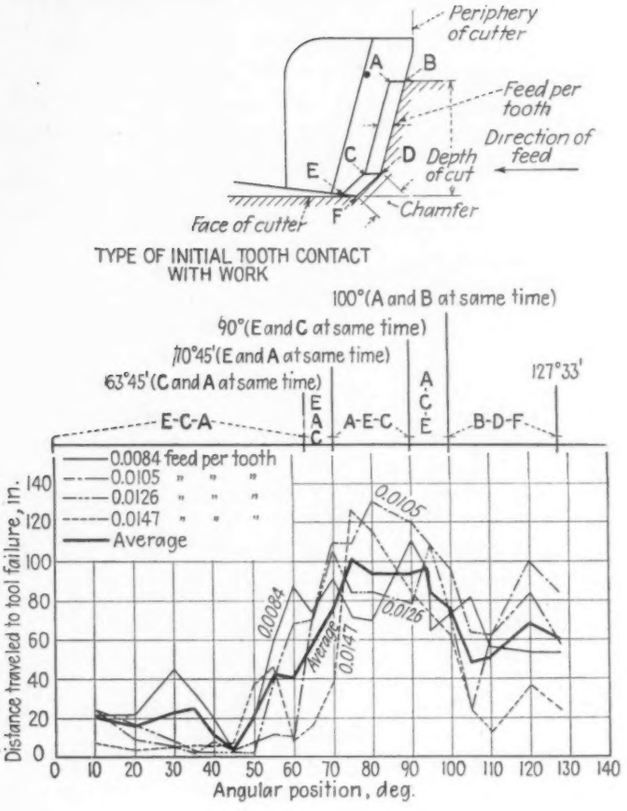


FIG. 5—Curves of cutter life for various work positions and feeds per tooth.

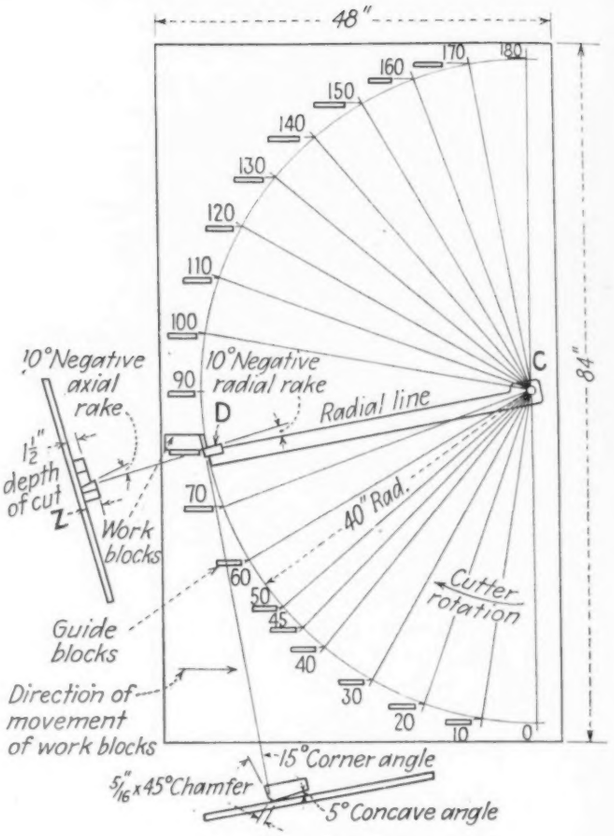


FIG. 6—Details of wooden model used to illustrate angular relation between cutter and work.

o o o

following feeds were used to permit exploration of a wide range of face milling activity:

Table Travel In. Per Min.	*Feed Per Tooth, in In.*
2	0.0084
2½	0.0105
3	0.0126
3½	0.0147

A depth of cut of 0.150 in. was taken on all runs, experience having shown that this is an average which shows wear similar to that caused by deeper cuts, yet does not involve the machining of excessive amounts of steel.

In order to determine the effect of work positioning in relation to the face mill while all other conditions were kept constant, as has been outlined, runs were made with the work:

(1) Shifted horizontally;
(2) Shifted in a direction perpendicular to the table travel;
(3) And shifted to each one of the positions listed in fig. 4.

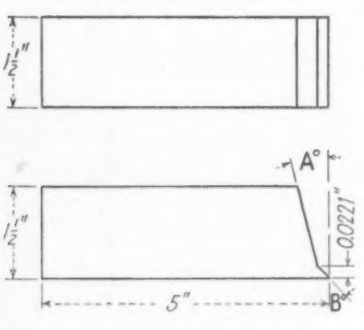
The angular position E in fig. 4 represents the position where the cutting edge on the 8-in. diam first contacts the work, while the dimension F gives the distance from the point at which the cutting edge on the 8-in. diam first contacts the work, to the 8-in. diam measured perpendicularly to the direction of feed.

During the milling runs, the work was shifted through a series of positions, as listed in fig. 4, from one extreme where E equalled 10° and F was 0.061 in., to the other extreme position where E equalled 127° 33 ft and F was 6.437 in. At each of these two extreme positions, the outside diam of the face mill overlapped the work-piece 1/16 in.

Each tool was run until the cutting edge showed the first sign of breakout. This was detected either from the marking on the inner side of the chip which came from the cut; from the lines left on the work surface by the corner angle; or from the change in sound made by the milling operation. The distance traveled by the cutter, and the power readings, were recorded for analysis.

Using the 20 different work positions and the four

FIG. 7—Details of wooden blocks used for determining the varying types of tooth contact.



ANGULAR POSITION	ANGLE ON EDGE OF WORK A	B
10-170	53°-32'	80°-36'
20-160	37°-06'	71°-18'
30-150	27°-50'	63°-32'
40-140	22°-30'	57°-19'
45-135	20°-39'	54°-46'
50-130	19°-13'	52°-35'
60-120	17°-09'	49°-07'
70-110	15°-55'	46°-47'
80-100	15°-13'	45°-27'
90	15°-00'	45°-00'

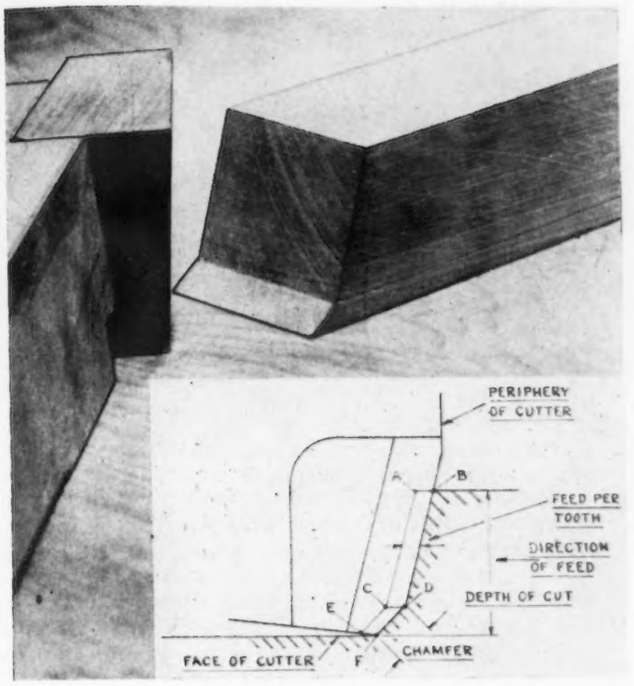
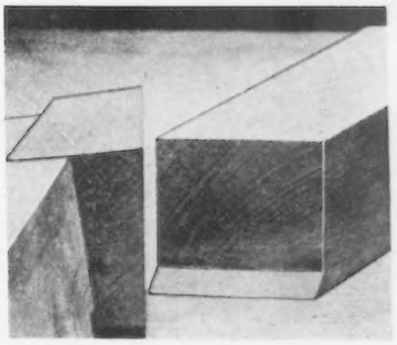


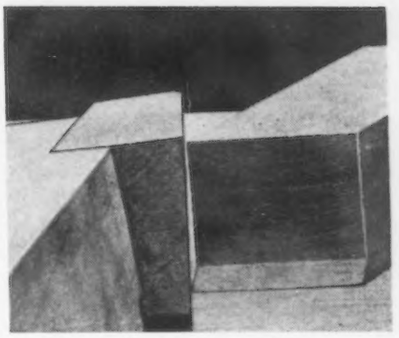
FIG. 8—Tool contact in sequence E-C-A exists from the zero position to 63°45' and gives very poor operating conditions.



RIGHT

FIG. 9 — At the 63°45' position, initial contact is at E followed by line contact from A to C, giving poor conditions.

o o o



RIGHT

FIG. 10 — Between 63°45' and 70°45', contact is in the order E-A-C and conditions are slightly improved.

different feed rates, a total of 190 runs was distributed as evenly as possible over the 12 tools. This gave 16 runs for each of 10 tools and 15 runs for each of the remaining two tools.

An average of the distances traveled up till the time of tool failure was plotted (see fig. 5) with its work position for each feed used. An average of all the runs made irrespective of the feeds used for each work position was also plotted.

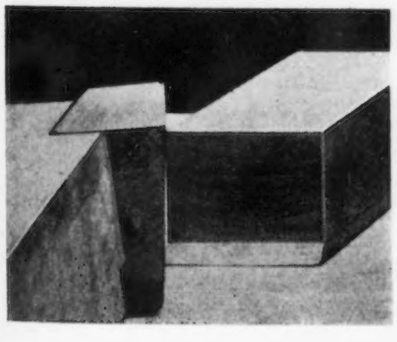
The runs were made first for the 2-in. feed per min; that is, 0.0084 in. feed per tooth. It was soon found that the various points arranged themselves in an irregular outline and also that the length of runs seemed to be somewhat erratic. Later, many additional runs were made at 0.0105, 0.0126, and 0.0147 in. feed per tooth, and it was found that not only did each set of runs follow the same general pattern, but also that the length of runs were much more consistent than were those for the 0.0084 in. feed per tooth.

Wooden Models Used

To assist in determining why all the curves followed a definite general pattern, an enlarged wooden model, ten times actual size, was made of the cutter-work setup. This is shown in outline in fig. 6. The base of the model is divided into angular spacing about a pivot point C. The block D, which represents an exact ten-times enlargement of the cutting portion of the tool, is mounted on the end of the arm so that the intersection of the 15° corner angle and the 5° concavity angle is at a 40-in. radius.

Ten work blocks were made, as shown in fig. 7, to the forms given in the table. This represents the exact contour cut by the cutter tooth when the entrance portion of the work is located at each one of the respective angular work positions.

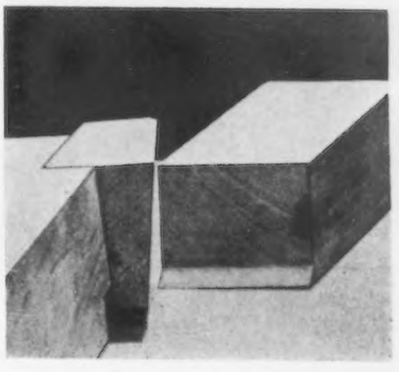
To determine the type of contact for any given angular position of the cutter tooth, the work block for that angular position was placed against the guide block and slid past the 40-in. radius for a distance comparable to the feed per tooth; that is, 0.105 in. for a 0.0105 in. feed per tooth. The cutter tooth was then swung in the direction shown until it contacted the work piece and the type of tooth contact observed. This procedure was repeated for each angular position. The results were compiled and the proper se-



LEFT

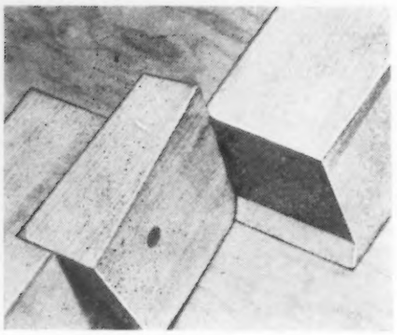
FIG. 11—The beginning of true double-negative cutting action occurs at 70°45' when contact is in the order EA-C and good performance is obtained.

o o o



RIGHT

FIG. 12 — Operating conditions are good between 75°45' and 90° when contact is in the order A-E-C.



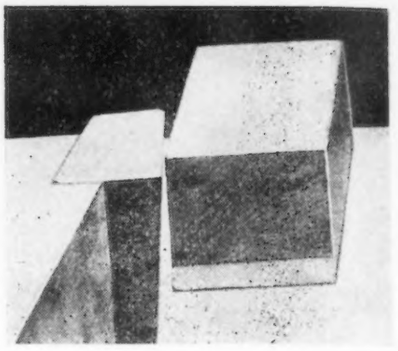
LEFT

FIG. 13—At 90° contact is in the order A-EC, and while conditions are still good they are slightly retarded.

o o o

RIGHT

FIG. 14—Between 90° and 100° the sequence is A-C-E and conditions are excellent.



quence of tooth contact for each position was recorded.

Figs. 8 to 16, inclusive, are close-up photographs of the various possible types of initial contacts between the cutter tooth and the work. All of these photographs were taken looking outward from the center of the cutter in a direction along the 10° negative radial rake angle on the face of the tooth.

Fig. 8 covers the conditions which exist when the point of initial tooth contact with the work is at a point E on the face of the tooth where it intersects the face of the cutter, and is at a distance from the cutting edge on the chamfer equal to the feed per tooth. This is followed by point C, and finally by point A, contacting the work. This occurs when the tooth enters the cut anywhere from the zero position up to the 63° 45′ position.

At the 63° 45′ position, the initial contact point of the face of the tooth with the work still remains at E, as is shown in fig. 9. However, as the cut progresses, the entire face of the tooth along the corner angle gives a line contact from A to C. This line contact is at a distance from the cutting edge equal to the feed per tooth.

In fig. 10 it can be seen that between the 63° 45′ position and the 70° 45′ position, the face of the tooth makes contact with the work in the order of points E at the face of the cutter; A at the top of the cut; and C at the intersection of the corner angle and the chamfer.

Fig. 11 shows the set of conditions which obtain at the 70° 45′ position where both A and E on the face of the tooth contact the work at the same time. This is followed by point C, also on the face of the tooth, and making the final contact. The point A is located at a 0.150 in. distance, which is the depth of cut from E at the face of the cutter. This marks the beginning of the true double negative cutting action, which extends up to the 100° position.

Between the 70° 45′ position and the 90° position, the initial point of contact is at A. This is followed by contact at E, and finally by contact at C. Fig. 12 clearly illustrates this set of conditions.

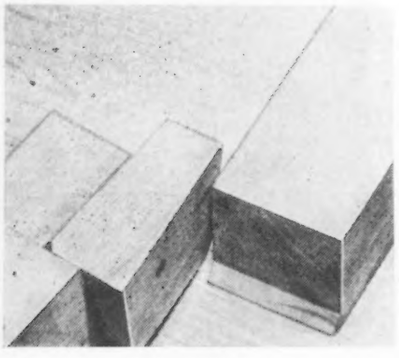
When the cutter tooth contacts the work at the 90° position, the initial contact is still at A. This is on the face of the tooth, as was illustrated in fig. 12. This is, however, followed by a line contact which is along the face of the tooth extending from C to E. This is parallel to the chamfer and is shown in fig. 13.

Fig. 14 shows the initial tooth contact being made on the face of the tooth at A, as was illustrated in both figs. 12 and 13. This is followed by contact at C and finally at E. This set of conditions prevails from the 90° position up to the 100° position.

At the 100° position, the initial contact between the face of the tooth and the work is a line connecting point A with B. The length of this line represents the feed per tooth. Fig 15 shows this condition. At this position, the engagement angle between the face of the tooth and the entering side of the work changes from negative to positive. In other words, at this position, the initial contact point moves from a point A on the face of the tooth, which is at a distance equal to the feed per tooth away from the cutting edge, up to a point B on the edge itself.

And finally, fig. 16 shows the condition which exists at all angular positions beyond the 100° position. The initial contact between the cutting tooth and the work is at point B, which is located at the cutting edge itself. This is followed by cutting edge contact at D and then at F.

The concluding part of this article appeared in the Dec. 13, 1945 issue of THE IRON AGE.—*Ed.*



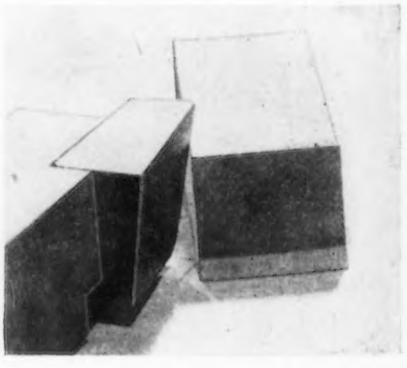
LEFT

FIG. 15—At 100° double negative action ends, with contact at AB-D-F, and conditions are still excellent.

o o o

RIGHT

FIG. 16—At all positions beyond 100° contact is in the order B-D-F, and conditions vary from fair to poor.



New Equipment . . .

Welding

. . . Recent developments in arc-welding compounds, resistant compounds, spot welders, flux removers, seam welders, fluxes, lightweight torches, dial feed welders, portable welders, hammers, and other devices are described and illustrated herein.

ELECTRODES which will perform satisfactorily on either ac or dc machines have been announced by *The Sight Feel Generator Co.*, Richmond, Ind., and are called Rexaloy Electrodes. Designed on the principle that toughness is a more desirable property than hardness, these electrodes are claimed not to become brittle after application, but to retain, within a few points, their original hardness throughout their use. They are said to be unique in their field, having a coating composed of chromium, nickel, copper, vanadium, manganese and other metals, the amounts of which vary with the type of rod. These blend with the core rod during the welding, forming a dense, slag-free alloy overlay. Deposits can be forged and heat treated.

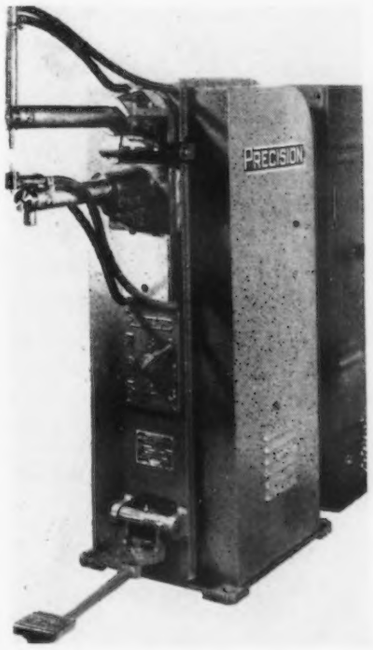
Arc-Welding Compound

AN arc-welding compound designed to aid in instantaneously creating and maintaining a metallic welding arc where low currents and small-diam electrodes are employed has been announced by the *Electric Welding Div. of the*

General Electric Co., Schenectady. Known as Strike-easy, this compound is easily applied and can be used on any kind of metal with any type of electrode. The compound, which is in paste form, is available in 1-lb glass jars, completely ready for use, without mixing or any other preparation.

Spot Welder

A MACHINE which overcomes the major objection to foot operation, lack of pressure, by a unique mechanism combining high



pressure with minimum operator fatigue, has been announced by *Precision Welder & Machine Co.*, Cincinnati, and is called a Precision Rocker Arm Foot Operated Spot Welder. Among its features are: (1) High welding pressures up to 400 lb on the electrodes with 50 lb exerted by the operator. (2) Unit construction with removable side covers keeps maintenance to a minimum. (3) Sides of machine kept clear for material handling and storage in keeping with motion-time production methods. (4) Timer and contactor mounted on rear. (5) Fabricated frame of channel construction insures rigidity. (6) Micro-switch firing of timer insures pressure before flow of current.

Resistant Compounds

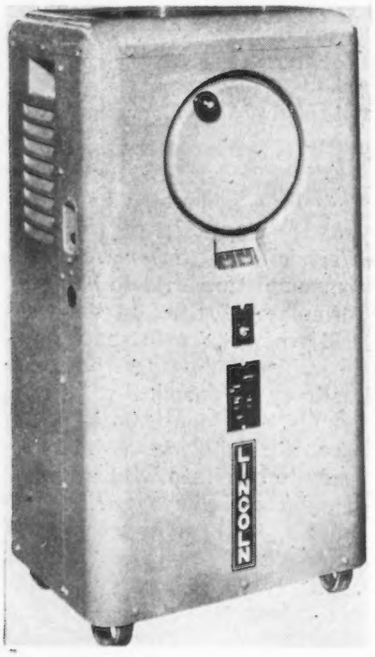
TWO weld-spatter-resistant compounds, No. 9951 and No. 9952, have been announced by the *Electric Welding Div. of the General Electric Co., Schenectady.* Both compounds are said to be specially formulated for use in the welding field wherever weld spatter is undesirable and must be avoided easily and economically. The compounds are identical in performance, furnished in powder form, ready to be mixed with water. The only difference between them is that the No. 9951 is nonadherent and can be readily removed with an air

hose or a dry cloth, while the No. 9952 is semi-adherent but can be quickly and easily removed with a damp cloth or a direct stream of water. A feature of these compounds is that the surface of the work, even if slightly oily, does not

require wetting before they can be applied. Another, is that a special ingredient in the compounds is said to eliminate the necessity of a water-soluble binder in order to obtain adhesion. They are economical to use, since one gal of either will adequately cover 450 to 750 sq ft of work, depending upon the thickness with which the compound is applied.

Portable Welder

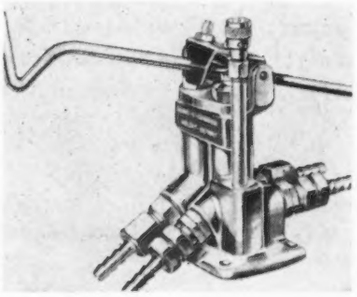
A WELDER which is said to be ideal for rural power lines and is claimed to overcome all the objectionable features of previous welders designed for this type of service has been announced by *The Lincoln Electric Co.*, Cleveland. This unit, called the "Fleet-Arc Jr.," is for 230 v, single phase power lines and is said to meet the limited input requirements of rural Utilities and REA by a design of



high efficiency and high power factor. It has a max input current of 35 amp and provides a machine which meets the new NEMA standards for this type of welder. It can be used with the standard 3-kva power transformer provided by the power company, and the current range is from 20 amp at 20 v to 180 amp at 25 v welding duty. Some of its features are: (1) Wear-free and vibrationless reactor current control with self-cleaning chain drive. No taps or plugs to develop loose connections. (2) Heavy copper winding with spun glass insulation and mica coil separators. Arc welded steel frame and housing. (3) This welder weighs only 360 lb and is, therefore, readily portable.

Welding Gas Saver

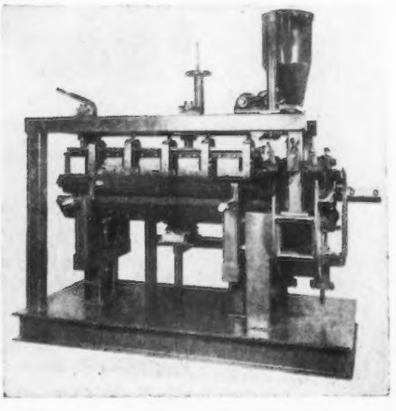
AN improved Gasaver, which is said to cut oxygen and acetylene consumption as much as 50 pct, has been announced by *Weldit,*



Inc., 641 Bagley Ave., Detroit 26. This Gasaver has two important features not found in earlier models. First, it has a new non-smoking pilot light. Second, the lever rod—on which torch is hung between welds to shut off both gas and oxygen intake lines—is quickly adjustable as to length, so that any size or weight of torch will automatically operate the closing valves. The device is said to eliminate the danger of open flame, regardless of the weight of torch used. It is designated as the improved Model "E."

Automatic Seam Welder

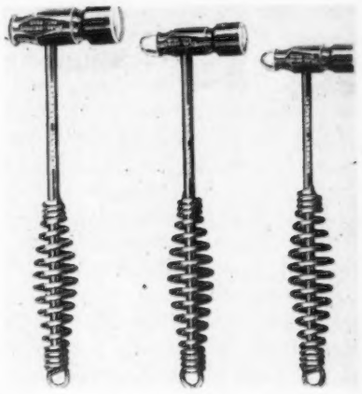
THE Berkeley, a completely automatic machine which can be operated by unskilled labor, has been announced by *Penn Tool &*



Machine Co., Danville, Ill. It has no open arc and does not produce fumes, and protective clothing, gloves or hoods for the operator are unnecessary. The welding is by means of the automatic electric arc submerged in granular flux. A uniform, x-ray quality weld that requires no finishing, is obtained at speeds from 50 to 250 in. per min depending upon the metal thickness. With the Berkeley, the preformed tubes are fed into one end of the fixture and emerge at the opposite end with the seam welded. One section follows another and the welding operation is continuous. This machine is made in a range of sizes to weld tubes from 4 in. to 21 in. in diam.

Hammers

ALL-METAL ball-pein hammers have been announced by *Atlas Welding Accessories Co.*, 14824 Wyoming Ave., Detroit 21. These hammers are said to give prolonged life, greater safety and perfect, dynamic balance. Heads are made of alloy tool steel, flame hardened for



toughness. They have a flex-o handgrip shaped to fit the hand, and also made to absorb shock of hammer blows. This handle is said to be unbreakable, can't burn or split and will never come loose from hammer head, for there are no wedges to come out. Safety is promoted because heads will not fly off, nor get out of alignment with hammer handle. It is claimed there is more wallop with less muscular effort due to balanced weight distribution.

Blast Nozzle

A LINE of nozzles using Norbide borium carbide inserts has been added to its line of Long-Lyfe blast nozzles, by *American Foundry Equipment Co.*, 555 S. Byrkit St., Mishawaka, Ind. Inserts are jacketed in abrasion-resistant alloy steel. The nozzle is guaranteed for 1500 hr when used with steel shot or grit and for 750 hr when used with silica sand.

EVERLASTING

in spite of the elements

Harper Everlasting Fastenings, at first glance, may seem remote from the Rock of Gibraltar, but the comparison is closer than you might suppose. The "Rock" has withstood the elements of wind and wave and time for centuries. To all intents and purposes it is Everlasting. Harper fastenings, made exclusively from non-ferrous metals or stainless steel, also resist the elements, rust and corrosion so stubbornly that they are considered Everlasting compared with common steel—or the products in which they are used.

BRASS
BRONZES
COPPER
MONEL
STAINLESS

everlasting fastenings

Harper Everlasting Fastenings may be ordered from a stock of over 5000 items including bolts, nuts, screws, washers, rivets, nails and special fastenings. Other special fastenings are made to order quickly from large stocks of raw material. Write for 104 page catalog.

THE H. M. HARPER COMPANY

2607 Fletcher Street . Chicago 18, Illinois

BRANCH OFFICES: New York City • Philadelphia • Los Angeles • Milwaukee • Cincinnati • Houston

Representatives in Principal Cities

HARPER *Chicago*

Assembly Line . . .

STANLEY H. BRAMS

• The national labor situation may be at the climax stage today, with improvement due before too long . . . Ford's bargaining is bringing parties closer together . . . GM outlook is not so favorable.

DETROIT—These are precarious days in which to write a column about the labor situation in Detroit, or anywhere else for that matter. What is perfectly valid at the time of writing may be quite twisted around or completely undone on the day of reading.

However, the feeling is beginning to prevail in automotive circles that perhaps the worst of the nation's labor trouble is now at hand, and that improvement, if it has not already set in, will be seen before too long.

Ford Motor Co. is not very far away from a settlement with the CIO United Auto Workers Union over its new contract. At the start of sessions this week the differential over wages narrowed down to 2c, the union asking the 19.5c per hr advance recommended for General Motors Corp. in the report of the recent fact-finding panel at Washington, while the company was offering 17.5c. However the company offer was still tied steadfastly to Ford demands for union security and other concessions. These company stipulations (THE IRON AGE, Dec. 27, 1945, p. 66) call for a large scale reduction in the number of union committeemen in the plant, penalties on the union and its members in the event of unauthorized strikes, and the further proviso that the pay raise shall not become effective until output reaches a rate of 80,000 cars monthly—an effort to balance costs and income.

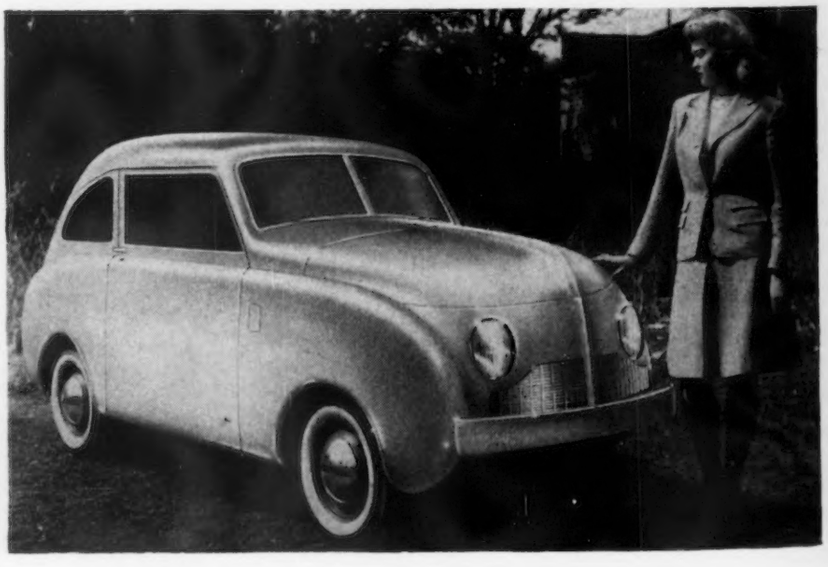
The position of the union negotiators in this issue is somewhat mixed. On the one hand, the political stock of Richard Leonard, UAW Ford director, has been rising steadily as a result of his ability to get the 17.5c pay raise offer from Ford, even conditioned as it was. However, communist elements in Ford locals have been more active of late than at any time in the past few years, and are at the root of considerable grumbling in the rank-and-file over the counter proposals on company security made by Leonard, which called for individual fines on wildcat strikers, without any liability for the union itself. The viewpoint of the communist block seems to be that in the past it was able to further its own ends by unauthorized strikes and similar disturbances, and that any penalties on instigators and followers of such strikes would make this tactic quite impotent. So there arises the large question of whether any deal made on company security would ever be approved by the membership, even with the endorsement of the negotiators.

Of further interest in this issue is the fact that no more than 19.5c is being demanded of Ford. It should be noted that the arrival of this figure in the General Motors case was based on an increase of 17.5 pct for its average $1.12 pay scale. The Ford pay scale is $1.21 (practically identical, incidentally, with the GM rates in the Detroit area), and on that basis the increase which might logically have been expected from the union would be 20.75c per hr. Apparently the arithmetical figure, rather than the percentage increase, is the objective of the UAW.

THERE is much less cause for optimism in the General Motors case. Here there is a 6c differential, the union demanding 19.5c and the company having offered 13.5c. In addition, the union is still making some mention of the ability to pay issue, which is complete anathema not only to General Motors but to the rest of management, and the company is indicating that it will demand some sort of security for itself in the new contract which will ultimately be negotiated to replace the one canceled by the company late last year.

There are comparatively few negotiations in this strike, especially

NEW CROSLEY: *The new Crosley automobile with a four-cylinder, 26½ hp engine is capable of doing 60 mph and operating 50 miles to the gallon. The car is 145 in. from bumper to bumper, has an 80 in. wheel base and a 40 in. tread. Its overall height is 57 in., its overall width is 49 in. and weighs 1000 lb. It has two seats in front, two in back and a luggage space 25 by 40 in.*



in the light of the fact that as of Jan. 24 it is 65 days old. The union, figuring that it compromised itself seriously when it reduced its demand from the original 30 pct to the 19.5c level set forth by the fact-finding panel, is not at all disposed to go any lower. On the other side of the fence, the company feels it has made more than a fair offer, one that not only satisfies but surpasses the original union demand for maintenance of the take-home pay levels of wartime. In addition, General Motors knows that its supply of glass is very low, that there will be no more until output is stepped up following the glass strike settlement at Libbey-Owens-Ford and Pittsburgh Plate. Original anticipations voiced here, considered extravagant and farfetched at that time, were that the General Motors strike would continue until about Jan. 19. This date has come and gone, and now it looks as though definitely more time will be required to reach a settlement.

In the meantime, one forthcoming move of the union very soon will likely be the order to all its members in tool and die shops to stop work on any General Motors tooling. Probably upwards of a hundred shops in Detroit will be affected, and it is obvious to anticipate the widest possible confusion, quite likely resulting in curtailment of other work as well, when this order becomes effective. Meanwhile, UAW has served notice on the tool shops that it wants a pay raise commensurate with the levels recommended in the GM fact-finding report.

MEANWHILE, Chrysler Corp. is basking in obscurity it keenly desires to maintain. Its labor negotiations have broken off, and its employees are working without contract of any sort, although indications are that customary grievance procedures outlined in the erstwhile contract are being carried forward in accustomed manner.

The hue and cry over the new agreement reached between UAW and Kaiser-Frazer Corp. is beginning to die down, but interest persists among labor relations people all over the country.

With all the General Motors plants down, with Nash closed because of glass shortages, and with Chrysler moving into output very slowly, the production picture of the automobile industry as it enters full on the New Year is none too optimistic. Ward's Automotive Reports estimated that last week's production totaled 28,465 vehicles, compared with 23,340 the previous week and 20,720 trucks last year at this time. Of the most recent total, around half came out of Ford Motor Co. assembly line.

Union Link Seen Weak In UAW-GM Strike At Electro-Motive Div.

Chicago

• • • **Probably the** weakest union link in the United Automobile Workers (CIO) strike against General Motors is in the Electro-Motive Div. plant at LaGrange, Ill., Chicago suburb.

Reports emanating from a meeting of the union local indicates that leaders raked the membership over the coals because 6000 requests had been received to be excused from picket duty out of a total of approximately 7500 members.

Union organization has been strong enough so far to halt a back-to-work drive. Even should such a movement develop, it is believed that difficulties in putting the plant in shape for production would make impractical immediate employment of any but a few maintenance workers and workers in key departments needed to prime the production pump.

Lack of sufficient maintenance workers is understood to have resulted in considerable damage to equipment and work in process which must be repaired before operations are resumed. Key department in the production train is the transmission department where volume production must be attained before assembly operations can start again. Coils which had been wound before the strike, but not dipped, soaked in varnish and baked, must be unwound and rewound because of swelling caused by moisture during the long idle period. Varnish tanks are said to have been allowed to harden, making it necessary to chip them out before placing them back in production.

Local machine tool men say that failure to drain lubricants in many of the machine tools in the huge machine shop prior to the strike will require considerable maintenance work before machining operations begin and that some actual damage may have been caused. It is estimated that approximately two weeks will be required following the end of the strike before full scale locomotive production can be resumed.

Electro-Motive, like other General Motors divisions, has been receiving and storing substantial quantities of material at holding points outside the plant. These will allow continued production once production momentum is attained, but will improve the pick-up only slightly.

Construction operations on additions to the plant are not being interrupted by the strike, the contractors' workers being under AFL jurisdiction.

Following initial refusal by pickets to allow office workers access to the plant, a court order has been secured allowing them passage.

Kaiser to Ship Steel And Plate to China

Oakland, Calif.

• • • **Sale of the first** commercial shipment of steel from the West Coast to China since the outbreak of war, and receipt of an additional order from the French government for 43,000 tons of steel plate, has been announced by Kaiser Steel.

The Chinese contract, which also calls for steel plate, was negotiated through a New York export house, and is part of China's industrial rehabilitation program. Shipment has just been completed from Los Angeles by two vessels destined for Shanghai.

The contract with the French government follows one previously announced by Kaiser on Dec. 1. The original purchase called for 55,000 tons of billets to be delivered over a four-month period. The Fontana plant will start delivery on the new order in January.

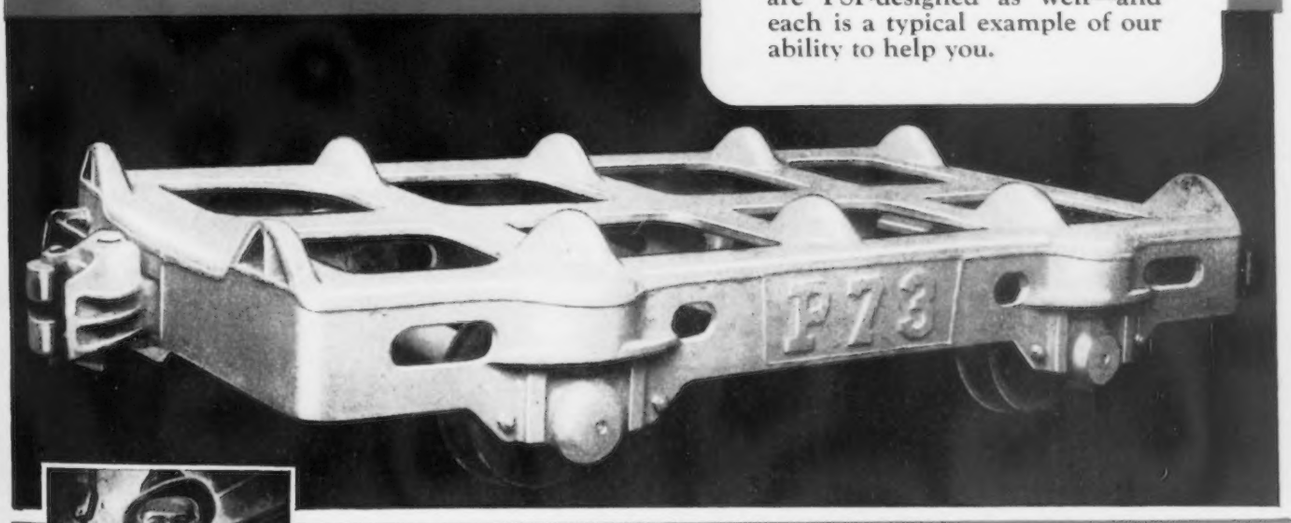
Notes on **STEEL CASTINGS**

Want them PLAIN . . .

or completely

MACHINED and ASSEMBLED?

No matter how you require your steel castings, call on PSF. We'll supply them in any size—merely surface-cleaned and rough-trimmed, or fully machined and assembled to meet your most exacting specifications. In either case, PSF's advanced methods and equipment assure castings of uniform strength and grain structure, and high dimensional accuracy. Note (top to bottom) the 11,500-pound ingot car, the open hearth charging box, and the fully-assembled charging box car illustrated. They're all made by PSF—some are PSF-designed as well—and each is a typical example of our ability to help you.



47 YEARS OF STEEL CASTING KNOWLEDGE

Pittsburgh STEEL FOUNDRY CORPORATION

Glassport, Pa. · Fort Pitt Steel Casting Div., McKeesport, Pa. · Pittsburgh Spring and Steel Co. Div., Pittsburgh, Pa.

Sales Offices: NEW YORK · PHILADELPHIA · CHICAGO · CLEVELAND · CINCINNATI · AKRON · WASHINGTON

W&D 9887

Washington . . . L. W. MOFFETT

• Growth in use of steel for railroad cars . . . Government-owned patents not yet declared surplus . . . Kaiser to improve Fontana.

WASHINGTON—In 1920 only 27.1 pct of the freight cars in the service of Class I railroads were of steel construction. At the end of 1944, steel constructed cars constituted 63.8 pct of the number in use, according to the Interstate Commerce Commission. There has been an even more decided trend toward steel cars in passenger car service. On Dec. 31, 1920, these carriers had 53,501 passenger cars in service of which 15,111 or 28.2 pct were steel. At the close of 1944, there were 37,837 passenger cars in service of which 31,283 were of steel construction. All of the passenger cars of the Pullman Co. at the end of 1944 were of steel construction.

There were 6573 passenger steel underframe cars in 1920, representing 12.3 pct of the total, while 31,817 or 59.5 pct were other than all steel or steel underframe cars. At the end of 1944 the number of steel underframe passenger cars was 5631 or 14.9 pct of the total, and 923 or 2.4 pct were wooden cars.

As the result of the scarcity of steel during the war years and the intensive use made of all available equipment, the proportion of steel freight cars increased only 3 pct during the 1941-1944 period. The number of steel freight cars in service increased 79.1 pct in 1944 over 1920, while those with underframes and of other construction declined 32.4 and 94.8 pct respectively.

* * *

No patents, processes, techniques and inventions now in the possession of government agencies have been declared surplus nor has any owning agency indicated any intention of declaring any of these surplus, according to a recent report of the Surplus Property Administration. There is, however, a possibility that some may be declared surplus at a future date.

The report was submitted in accordance with provisions of the Surplus Property Act which also provides that the Attorney General shall be notified of the terms and conditions involved whenever a disposal agency begins negotiations for disposition to private interests of patents, processes, techniques and inventions, irrespective of cost.

The primary interest in such patents and processes owned by the government lies in their application to production of useful goods and the stimulation of technical progress. The inventions and knowledge in possession of the government have been applied very infrequently in industry, which practices probably resulted in the inclusion of patents, processes, techniques and inventions among the classes of property appropriate for disposal under the Surplus Property Act.

Generally government agencies have not heretofore sold or assigned patents or granted exclusive licenses unless they had been given specific statutory authorization for such disposition. This practice was based on the assumption that such disposition required the specific authorization of Congress. However, the Attorney General ruled in 1924 that a government department had the authority, in the absence of specific legislation, to grant nonexclusive, nontransferable, revocable license under government-owned patents. As a result of this opinion, the belief has been that licenses might be granted without specific statutory authorization.

CONFLICTING opinions with regard to the sale by the government of patents or processes or the granting of exclusive rights thereunder will necessitate final determination of disposal policies by the Congress. It has been suggested that the government should never sell to private interests a right to exclude others from the use of a particular invention. Conversely, it has been argued that there are special circumstances under which such an arrangement would be desirable because it may mean the stimulating of the commercial use and development of an invention in the public interest. It has been pointed out that the granting of nonexclusive license would not

Steel Use Per Railroad Car Output

Year Ended December 31	Type of Construction			Pct of Total		
	Steel	Steel Underframe	Other	Steel	Steel Underframe	Other
1920	630,150	886,296	805,579	27.1	38.2	34.7
1925	757,065	1,056,125	544,031	32.1	44.8	23.1
1930	854,864	1,118,257	303,672	37.6	49.1	13.3
1935	809,612	908,252	117,790	44.1	49.5	6.4
1940	956,004	640,428	57,142	57.8	38.7	3.5
1941	1,035,918	613,730	53,576	60.8	36.0	3.2
1942	1,091,011	604,065	50,350	62.5	34.6	2.9
1943	1,104,772	604,369	47,136	62.9	34.4	2.7
1944	1,128,340	599,224	41,955	63.8	33.9	2.3
Pct of change: 1944 over 1920	+79.1	−32.4	−94.8	....	....	....

SPEEDS-UP ROUGHING AND FINISHING

SUNOCO EMULSIFYING CUTTING OIL...

Specified for cutting high-carbon steel castings with Stellite Tools

Production-engineers are keen judges of the performance of modern cutting-lubricants. Shown above is a case where the engineers picked Sunoco Emulsifying Cutting Oil to help speed-up roughing and finishing of high-carbon steel castings.

Operation:	Roughing and finishing 8½" wheel-hub
Machine:	Gisholt 2L production turret-lathe
Material:	High-carbon steel casting
Feed:	.017" roughing; .009" finishing
Spindle Speed:	29 R.P.M.
Surface Cutting-Speed:	64.5 feet per minute
Type of Tool:	Stellite
Cutting Lubricant:	1 part Sunoco to 20 parts water

This case is just one of thousands in which experienced production-engineers have picked Sunoco for heavy cuts at high speed . . . long tool-life with minimum time-out for regrinding and resetting . . . high finish and close tolerances.

Sunoco is recommended by leading manufacturers and users of machine-tools for a wide variety of cutting-operations . . . on lathes, drill-presses, boring-machines, milling-machines, hobbers, and grinders.

Consult the Sun Cutting Oil Engineer near you for complete facts on Sun metal-working products. His services are yours to use to help you increase production and cut costs.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News-Voice of the Air—Lowell Thomas

SECRETS OF PETROLEUM SCIENCE REVEALED

At Booth E-605, National Metal Congress, February 4th to 8th. Complete exhibit of making of petroleum products—producing, refining, transportation, and industrial application. Don't miss it!

SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY

provide sufficient inducement for private enterprise to undertake production because of the large development and marketing expenditures.

It is further contended that the government should, in lieu of granting exclusive rights, dedicate patents and processes to the public for widespread use.

Although no precise information is available as to the quantity and character of government-owned patents, processes, techniques and inventions, the Alien Property Custodian now holds about 50,000 patents as well as technical information formerly owned by residents of enemy or enemy-occupied countries.

The Register of Government Interests in Patents set up in February, 1944 for the purpose of recording all assignments, licenses or other patents or patent interests is still incomplete.

The National Patents Planning Commission has estimated that in 1945 the government owned approximately 500 patents. There were in addition to that number approximately 3000 unexpired patents of government employees which are covered by royalty-free license rights.

The largest departmental holdings appear to be those of War, Navy, Agriculture, Interior and Commerce Depts. and the Tennessee Valley Authority.

* * *

Reports that Henry Kaiser plans to abandon the Fontana mill have been branded as false by RFC officials, who point out that the RFC is now in the process of spending about $13,000,000 for improvements at the mill.

RFC also reports that Mr. Kaiser has abandoned his attempts to have the present terms of his government loan changed and now agrees with RFC that the terms can be met if the mill is operated efficiently.

At present the mill is operating at capacity and Mr. Kaiser has requested permission to buy several thousand tons of steel slab from Geneva. When the Geneva mill was shut down approximately 30,000 to 40,000 tons of slab were on hand.

* * *

Included in $84,739,000 worth of urgency materials which the Navy has declared surplus is $2,114,000 worth of barbed wire, by far the largest metal item on the list. Other items are tin, $2000; antimony, $6000; light gage steel sheet and strip, $233,000; lead, $57,000; brass battle scrap, $12,000; soil pipe, $25,000.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

RFC Licenses Many Machine Tool Dealers

Washington

• • • **Approximately 250 dealers** have been licensed by RFC as agent outlets for disposal of surplus machine tools under the new program recently announced by that agency (THE IRON AGE, Dec. 6, 1945, p. 124). A total of around 600 applications have been received to date, according to an agency spokesman.

However, this response is considered preliminary inasmuch as delays were encountered in distributing the necessary forms and receipt of applications has been slowed during the holidays.

Only a negligible number of applications for licenses have been denied by RFC agency managers, it was pointed out, and these have been referred to Washington for further screening as provided for in the regulation.

Due to the very liberal criteria under which dealer-agents may be appointed, RFC expects that a substantial number of applications will be filed within the next month.

Pricing Method Set Up

Washington

• • • **Effective Jan. 15,** OPA has provided manufacturers of steel shipping containers, general line cans, and steel reels or spools with a procedure for applying for individual ceiling increases.

To be eligible, an applicant for a price increase must show (1) that he is currently suffering financial hardship, and (2) that either his established maximum prices are below the general level of prices of other producers or that they impede production needed for an orderly reconversion to a peacetime economy.

Geneva Bid Award April 1

Washington

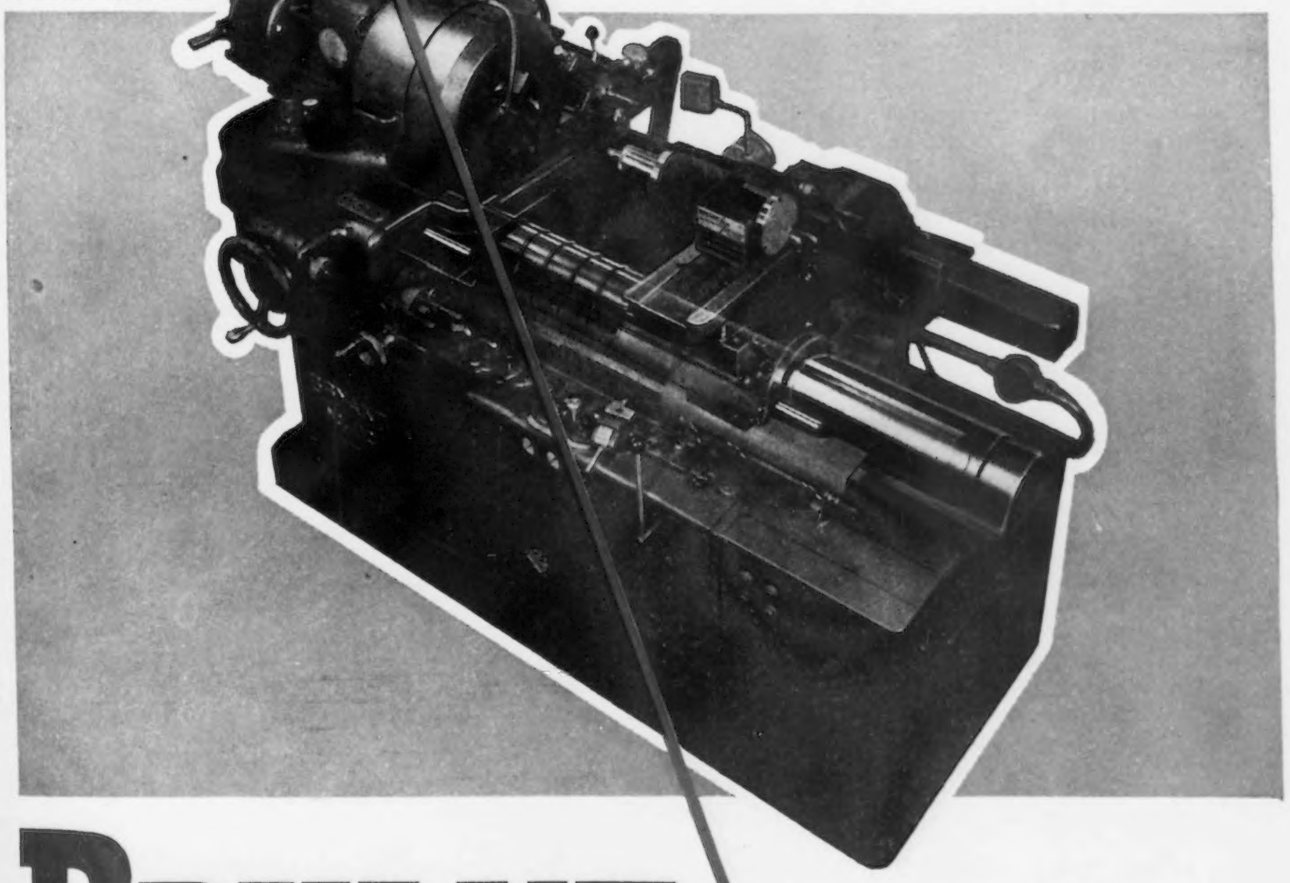
The date for opening of sealed bids or proposals for the purchase or lease of the government-owned plant at Geneva, Utah, has been extended 30 days to April 1. Announcement of the postponement was made by Lieut. Gen. Edmund B. Gregory, board chairman of the War Assets Corp.

We have reversed the design . . . but NOT the principle

Users agree that the Bryant principle of *cylindrical slide construction* is ideal for the fast, precise, economical production of internally ground parts. Bryant engineers knew that this same principle, applied *under the work head*, would be more practical for certain types of jobs. The result was the Bryant No. 112. This result has been *tested and proved* for the past five years.

The No. 112 is the last word for the internal grinding of tool room and small lot parts. It is designed with simple, concentrated controls — tooling and fixtures may be changed quickly — production is extremely fast — accuracy and work finish are among the finest ever produced by any grinder of any type. To help determine the value of the Bryant No. 112 on your work . . . *Send for the man from Bryant.*

PHANTOM VIEW OF BRYANT No. 112



BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VERMONT, U. S. A.

West Coast . . .

OSGOOD MURDOCK

• Western steel producers prepare for the worst . . . Machinists show signs of softening . . . Matson soon to get back two ships . . . Industrial center around Geneva rumored . . . Southern California prospers.

SAN FRANCISCO — Watching almost hourly press reports on the progress of negotiations between Benjamin F. Fairless, president of the U. S. Steel Corp. and Phillip Murray, president of the United Steel Workers, Western Steel producers were as jittery as investors watching the ticker report a fluctuating stock market.

Having prepared for a possible shutdown on Jan. 14 and then getting a reprieve, local producers swung back into almost normal production for most of the week of grace. However, as it became apparent that settlement of the impending strike was far from a sure thing, operating men began the old routine of preparing to close down openhearths Sunday so that the midnight deadline would find them empty.

Columbia Steel Co. planned to stop charging openhearths at Pittsburg and Torrance, Calif., Sunday morning and to make the last cast of iron from the blast furnace at Provo, Utah, Sunday afternoon. Maintenance men were to be allowed by the union to keep furnaces hot and to maintain a low wind on the blast furnace. The coking plant at the Provo blast furnace was to continue operation on a small scale in order to keep the town of Provo supplied with fuel gas for domestic use. Approximately 4500 workers of the Columbia Steel Co. would be affected by the strike.

Bethlehem Pacific Coast Steel Corp. plants at Los Angeles, south San Francisco and Seattle planned the same routine, with the prospect of 3000 men being idle. Bethlehem has an added problem in that the men in its fabricating shops are affiliated with United Steel Workers of America and would also be called out. Other fabricators in the affected areas are in better shape and expect no labor trouble, but are gloomily anticipating what would happen to their already slim inventories if the strike runs for a few weeks.

The only report from the Fontana plant of Kaiser Co., Inc., was "we are watching developments." but it is understood precautions similar to those taken by other producers were underway.

Since Western rolling mills would close down normally on Saturday night anyway, no shutdown problems are involved in this end of the operations.

As the steel strike began to give indications of solidifying from the mass of molten negotiations into a hot ingot of grief, local machinists and employers are making progress. Machinists District Lodge 115, which has followed an independent course in negotiations even though affiliated with Lodge 68 in the AFL suspended International Assn. of Machinists, has been offered a pay increase of approximately 18 pct which, it is believed in local labor circles, will be accepted by the membership at a Sunday (Jan. 20) mass meeting.

Actually the cash increase offered is 15 pct, but approximately 3 pct more is represented by six holidays with pay at straight time when not worked and a paid vacation and severance pay plan based on straight time hours worked.

While the prospective settlement between employers and Local 115 is the brightest ray of hope seen in the strike which has tied up 55,000 workers since Oct. 29, there is no assurance that the two other labor groups involved will trail along. On the contrary, Lodge 68, International Assn. of Machinists and CIO Machinists Local 1304 in the San Francisco Bay Area which claim membership of 12,000 and control approximately 200 shops, have indicated that should Local 115 sign the proposed agreement they will continue their fight for the originally demanded 30 pct increase. Local 115 has a membership of approximately 1000 machinists employed in 31 East Bay plants.

Much of the credit for what looks to be the settlement of at least a part of the strike situation is being given to international representatives of the union.

Consensus of employers is that with this break in what had otherwise been a solid front, complete settlement will be effected within a week. Added to the industrial concerns hoping for an early settlement is the War Shipping Administration which attributes a large part of the ship pile-up in San Francisco Bay to the inability of WSA to get ships decommissioned because of the strike. (See below).

* * *

AFTER one more round trip to Australia to pick up war brides the former luxury liners Matsonia and Monterey are to be returned to Matson Lines by the War Shipping Administration, it has been announced. It is believed that these two ships are the first to be handed back to owners since the end of the war and plans are already made by Matson Lines to spend $3,500,000 on each ship to convert it into the luxurious liner it was before the war paint was applied. Some slight modifications of their wartime facilities have been made to adapt the two ships to the bride ferrying service, but the major overhaul will come about on their return scheduled for March. Both ships are approximately 18,000 gross tons and have seen approximately 20 yr service between the West Coast and Hawaii to which run they will again be assigned. They are reported to have cost $8,300,000 each and have a speed of 21 knots.

Where the overhauling and reconditioning will be done has not been announced as yet, but it is understood a Western yard has the inside berth.

Ships and shipping are very much in the minds of all residents of the San Francisco Bay Area who have only to look out their windows and see almost 800 ships of all types anchored in the Bay. It might be

supposed that the "bridge of ships" the steel industry helped to build has been moved bodily to this area in an effort to relieve the congestion on the San Francisco Bay Bridge. According to best figures available there are almost 500 Navy ships, and 300 merchant ships which are controlled by the War Shipping Administration. The jam will only be broken when decommissioning facilities open up again with settlement of labor troubles, loading speeds up, some of the older hulks are put in the "graveyard" at Suisun and others go out on new assignments from the Navy.

The shipyards and shops of the General Engineering & Drydock Co. of San Francisco and Alameda have been purchased by Godfrey K. Waters, New York engineering contractor, from George K. Armes and James H. Young, the founders, for an undisclosed price, but believed to be well into the millions, it has been announced.

The shops and yards of the company have been listed by the Navy as desirable for maintenance on a permanent basis and constitute one of the five major shipyard facilities of the Bay Area. During the war the company concentrated on ship repair work.

It is understood that Mr. Waters will assume immediate charge of operations with offices in San Francisco and that no changes will be made in the operating staff or company policies.

* * *

SALT LAKE CITY — Perhaps someone, some day will write a book titled, "Forever Geneva." If it is not done, a lot of good material will have been wasted—if it is written, the latest story circulating in this area and out on the Coast should certainly be included.

It seems that U. S. Steel Corp. wants the Geneva Steel Co. plant and is prepared to bid accordingly. Then, if successful, the corporation with support of large automobile manufacturers and other industrialists will develop a manufacturing center in the vicinity of the steel plant. Ford, General Motors and Chrysler have all been mentioned as being interested in the project. As the still nebulous plan now stands, the development would take place along the railroads from Geneva north to Lehi, paralleling the edge of Utah Lake. Believers in the ethereal project insist it is practical and smacks of sound economics because the area under consideration is virtually equidistant from Seattle, Portland, San Francisco and Los Angeles markets.

* * *

LOS ANGELES — Encouraging figures on industrial growth of this area are bolstering the courage of local businessmen who have been reading more about labor disturbances in their back yards than they would like.

That the overall outlook is bright in spite of tear gas bombs which spread their influence beyond the picket lines and into the eyes of some forward looking businessmen is shown by the increase in the number of corporations formed in this area.

According to figures released by Frank M. Jorden, secretary of state, southern California will be headquarters for 68.1 pct of the new corporations formed in California during 1945. In that year 4683 corporations were authorized to operate in the state with a total capitalization of $1,113,969,220. This is the largest number of new companies since 1931, and 1856 more than took out papers in 1944.

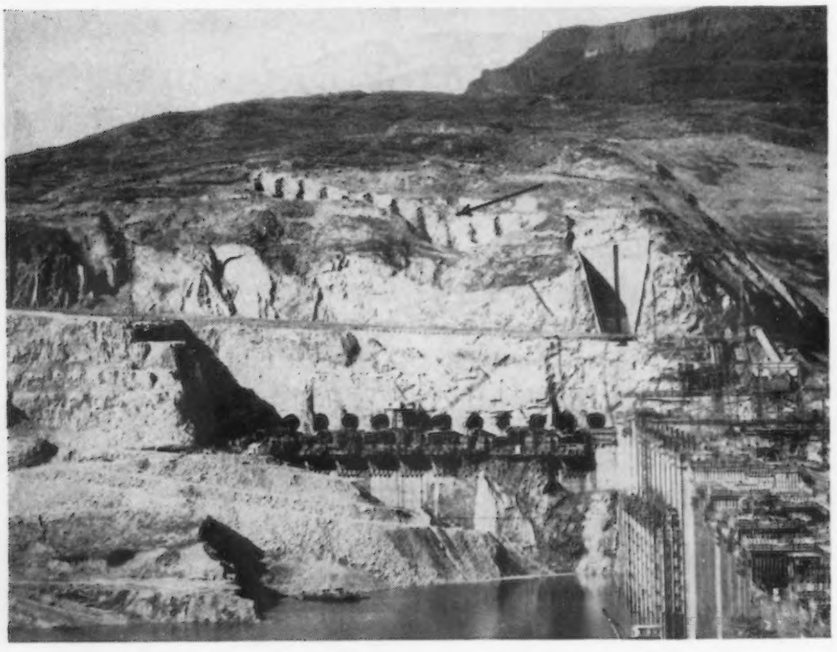
Employment in southern California industry fell off about 30 pct after the end of the war with Japan but today is approximately 80 pct higher than before the war started. Industrial employment showed an increase of more than 10,000 jobs in December to bring total employment in this field to approximately 233,000 in Los Angeles County. In addition there are reported to be 97,000 jobs in the so-called white collar classification of industrials.

Good news for 31,700 workers of Lockheed Aircraft Corp. in this area was the authorization by the wage stabilization division of the United States Dept. of Labor of a 15 pct blanket increase in wages. This will give an average increase of $1.44 a day to workers and is retroactive to Nov. 5, 1945. The agreement, negotiated by Aeronautical District Lodge 727, International Assn. of Machinists, also provides for a minimum wage of 86c an hr.

Ford has started construction of the $4,000,000 plant in the southeastern part of the city where it is planned to assemble 250 Mercury and Lincoln cars per day. The new plant will employ about 1500 persons and have an annual payroll of about $5,000,000 according to Nelson F. Bowe, manager of the Long Beach Ford assembly plant.

To keep pace with increasing automobile production the U. S. Spring & Bumper Co. is embarking on a $1,500,000 expansion program according to company officials.

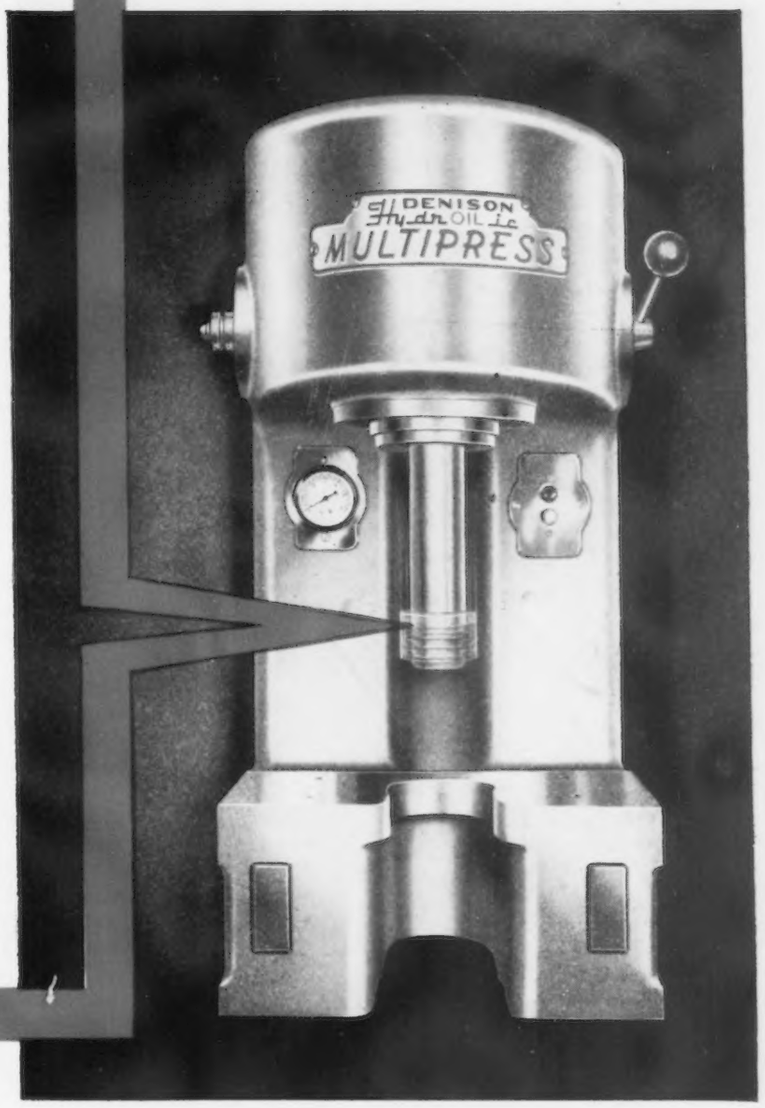
GRAND COULEE DAM: *Tunnels pictured here have been driven by the Bureau of Reclamation through a barrier of granite at Grand Coulee Dam to serve the Columbia Basin Irrigation System in south-central Washington. Arrow shows where the tunnels emerge halfway up the hill.*



Where can YOU use this amazing new *VIBRATORY* ram action?

(Oil-Hydraulic)

Ram action that permits short, rapidly-repeated uniform pressure strokes of regulative length, frequency, pressure and number per ram cycle



● So many startling advantages have been found in this new *exactly-controlled vibratory ram action* that, thus far, even we know only a few of its potential applications. Performance tests indicate that it may *revolutionize* scores of operations!

If your production includes *any* operation which you think might be improved by rapidly-repeated, uniform-pressure strokes, Denison engineers will be glad to adapt Vibratory HydrOILic Pressure to your specific needs! Write for information today!

* * *

This new vibratory hydraulic pressure principle is available in the equally amazing Denison Multipress—a four-ton and six-ton bench-size oil-hydraulic machine tool that performs almost any type of production operation calling for controlled pressure. *Let us send you the latest, fully-illustrated bulletin on* MULTIPRESS.

The DENISON Engineering Co., 1158 Dublin Road, Columbus 16, Ohio

DENISON EQUIPMENT *is* APPLIED *Hydr*OILics

HydrOILics INDUSTRY'S RIGHT HAND

European Letter . . . JACK R. HIGHT

• Surplus tool inventory promoting British sales . . . Dealers participating in 7½ pct commission . . . Site sales also used.

LONDON—Surplus machine tools property of the British government are the subject of an enthusiastic buying spree in seven Machine Tool Disposal Centers, scattered over the British Isles. Complete records of all offerings are duplicated in the various centers, and industrialists and approved dealers acting for them are competing keenly in prompt bidding for scarce general purpose lathes, universal milling machines, radial drilling machines and jig borers.

In the London center the buying has settled down to a regular routine, with a regular flow of dealers, individual buyers and exporters arriving each day. Results for the whole program thus far include the sale of over 12,400 tools, at a value of more than £3,500,000 ($14,000,000). The present scale of operations is resulting in the sale of an average of 500 tools per week. Special discounts have been included in the prices to encourage British industry to re-equip with modern tools, so that after new prices have been adjusted for normal factors of age and condition an additional reduction is made, probably about 20 pct of the new price.

Sales to foreign countries have recently been approved, so any tool any other than lend-lease supplied which has been offered to British industry for more than four months is automatically cleared for export sale. This section of the program was not set up until Nov. 1, so the actual volume of exports has been quite small, but is expected to increase. The quoted price to British buyers gets an automatic increase of 20 pct for export sale.

Staffed mostly with men who handled the tools during the war through the Ministry of Supply's Machine Tool Control, the Machine Tool Disposal group is functioning at present through both inventory sales by description and subsequent inspection, and by outright "site sales," where a department store technique is used. The theme is carried out through "January Clearance Sales" which are to be held this month.

Firms which were using government-owned tools here in Britain during the war were paying a rent amounting to 12½ pct of the purchase price per year, and as in America were given first option to buy at the Ministry's price all the tools which they had been using. The tools that Machine Tool Disposal is handling are the residue after more than £1,000,000 ($4,000,000) worth have already been sold to their wartime users.

After the Ministry involved has declared a tool "redundant" and the firm has declined to purchase, the regional office of disposals involved sends an inspector for a first cursory examination. The principal concern at this time is for scrappers, which are handled direct without seeing their way to a government storage depot, and to ascertain the general dimensions and weight of the tool.

WHEN the tools arrive at warehouse they are given a more minute inspection, and are valued on the basis of the inspector's report on the basis of age, condition, and supply and demand factors for special tools. A master specification sheet is made out for each tool, describing all the general details of the machine, but without indication as to its condition except for the offering price. The master sheet is duplicated for inclusion in the regional office listings, and the tool goes on

QUEUE HERE FOR TOOLS: *Sale of surplus British government machine tools at disposal centers is attracting a regular group of dealers who buy on commission for their customers. Early arrivals waiting for the opening of the office in London include representatives from left to right as follows: F. Schlesinger, Soag Machine Tools, London; P. A. H. Meats, representing an ultimate customer, Hard Alloys; Mrs. D. Blanche, M. C. Layton, Ltd., London; S. A. Bigg, Buck & Hickman, London; T. Pilcher, James W. Carr Co., London; G. Atterwell, Thos. P. Headland, Ltd., London; S. G. Driver, James W. Carr Co.; W. Stanford, T. W. Ward, Ltd., London; E. Reay, and L. Waller, both of George Cohen Co., Ltd., London; and W. W. Bode and R. Johnson, both of Alfred Herbert, Ltd., Coventry.*

NEW TOOL OFFERINGS: *Item of greatest interest to British machinery dealers prospecting for tools for their customers is the special offering of newly listed tools, which is changed each day. Company representatives make the new offerings their first port of call on arriving at the disposal center.*

sale as soon as the disposal centers insert the new listings (see illustration).

Included in the description on the specification sheet is a six digit code number which classifies the machine in its exact category. The listings are arranged in the sales centers in bindings according to type for easy reference. Prospective buyers visiting the disposal center are given access to the binders, and are handed forms which give them permission to go out and inspect a tool in any storage depot, as well as one on which they may offer to buy if they so choose. Offers to buy have a time date stamped on the moment of receipt for future reference in case there are a number of offers for a single tool. A simple clearing house operation at headquarters determines the buyer, and a direct cash transaction between the ultimate consumer and the government ensues. When the money is paid, a release is sent to the buyer, and he makes his own arrangements for removal.

The regional disposal centers are located in London, Birmingham, Bristol, Leeds, Glasgow, Belfast and Manchester, where duplicate records of all tools are kept. Specification books are kept up to the minute so far as possible by telephone communications, with individual listings being removed as soon as an offer to buy is received in any office. Such listings as are removed are placed in a suspension file until the sale has been completed.

DEALERS PARTICIPATE: *Important part is played in the British machine tool disposal program by a list of authorized dealers who are available to prospective buyers to aid in the searching and inspection processes. All so authorized dealers are listed in each disposal center, and are paid for their activities on a commission basis by the government. At the London disposal center, P. A. H. Meats, representing Hard Alloys, Ltd., is a prospective buyer looking over the list.*

An important place has been made in the British disposal plan for a list of approved used machinery dealers, and the government is paying them a fixed fee of 7½ pct for their services. They visit the disposal centers regularly with lists of their customers' requirements, and a special procedure is used for them to make offers for their clients. They are required to specify to whom the tool is to go, and the government makes the deal directly with the user. Dealers are not permitted to buy for stock.

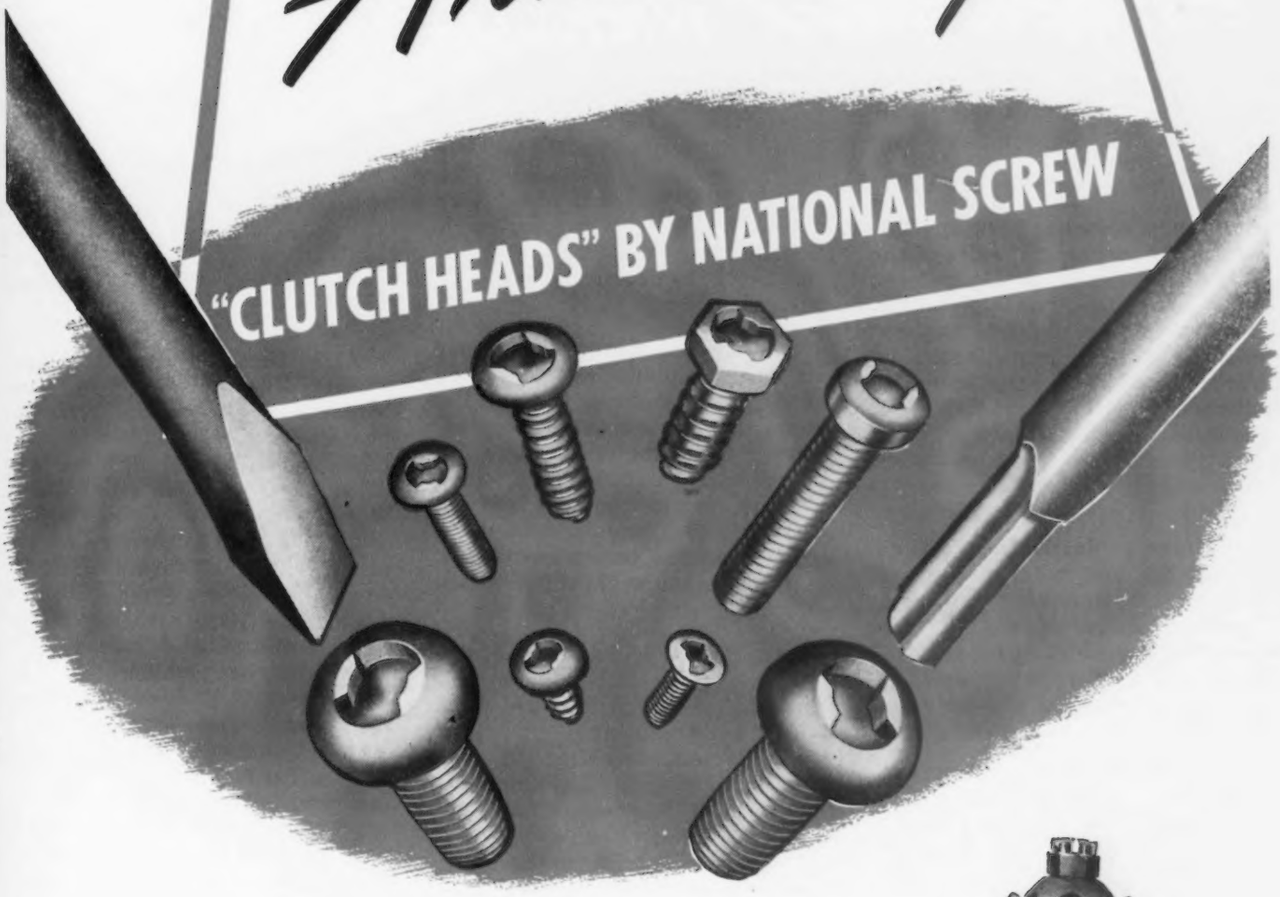
As a convenience for the dealers and other cutsomers a special set of binders is being used in all of the centers for new arrivals. New listings appear in these books on their first day on sale and are removed to the regular file at the end of their first business day. Thus any dealer can, by going through the new listings books, keep up to date on what is up for sale.

The present system in the London office is for the dealers to be permitted to examine these books at 9:30 a.m. (there are eight or nine firms present each morning) and for the general public to be admitted at 10:00 a.m. No offers to buy are accepted until 10:30. Listings of approved dealers are available for the inspection of any buyers who want to enlist aid, and an effort is made to gradually weed out those dealers who are not actively operating in the program, removing them from the lists. The services of the dealers are free to the prospective buyer and are welcomed in most cases. As well as searching for suitable tools dealers often carry out inspections of specific tools for their customers.

In consideration of the terms of the machine tool lend-lease settlement concluded last year, all tools furnished by the U. S. during the war on lend-lease terms are so stamped on the specification sheet. They are stated to be not available for export, and an extra check is made on the system for possible errors before any export sale is finally closed. There are a great number of American tools in the pool available for export.

Announcing

"CLUTCH HEADS" BY NATIONAL SCREW



To serve industry still better with the most complete line of fasteners made by one manufacturer, we now offer the new and modern CLUTCH HEAD SCREWS.

More speed, added safety and longer tool life combine to reduce costs when Clutch Heads are used. Can be driven with a conventional screw driver or a special type driver. "Lock-On" feature permits easy one-handed reaching, driving and withdrawing.

In addition to the most complete line of staple fasteners made, we produce the following patented fasteners:

Phillips Recessed Screws	**Lok-Thred Studs**
Laminar Flow Screws	**Rosán Fasteners**
Marsden Lock Nuts	**Scrivets**
Huglock Nuts	**Hi-Shear Rivets**
Dynamic Lock Nuts	**Lock Washer Assemblies**
Drake Lock Nuts	**Clutch Head Screws**

Consult with us for information or advice on any fastener question.

National
HEADED AND THREADED
PRODUCTS

THE NATIONAL SCREW & MFG. CO., CLEVELAND 4, O.

PERSONALS

o o o

• **Herbert Johnson** has been appointed assistant to the vice-president in charge of sales of Jones & Laughlin Steel Corp. Mr. Johnson has been employed in various capacities by J & L since 1940. He was a member of the company's legal dept. prior to his present appointment. **Russell J. Greenly** has been placed in charge of personnel administration. Formerly chief of personnel and training for Carnegie-Illinois Steel Corp., he recently was deputy in charge of industrial relations activities, WPB.

• **Thomas Toby** has been appointed eastern manager of sales of the Pittsburgh Screw & Bolt Corp., with offices in Philadelphia. Mr. Toby, formerly district manager of sales in the corporation's New York office, has recently been discharged from the Navy. **Robert M. Smith** has become district sales manager of the corporation's New York office.

• **William A. Marsteller** has been appointed general advertising manager of Rockwell Mfg. Co., Pittsburgh. Mr. Marsteller has been vice-president in charge of sales, advertising and industrial relations of Edward Valves, Inc., E. Chicago, Ind., a subsidiary of the Rockwell Mfg. Co.

• **Clyde M. Watson** has been added to the sales force of the Hendrick Mfg. Co., Carbondale, Pa., and will cover Georgia and Florida. **R. Grayson Yarrington** has joined the company to handle sales in the major portion of Maryland.

• **M. R. Underwood** has become affiliated with the Pioneer Engineering & Mfg. Co., Detroit. Mr. Underwood assumes the duties of director of purchases for both Pioneer Engineering and Pioneer Pump & Manufacturing, bringing to his new post the accumulated experience of over two decades of service in industrial procurement.

• **Richard Stevens** has been appointed blast furnace superintendent at the Warren district, Republic Steel Corp. Mr. Stevens comes to Warren from the Republic plant in Youngstown where he has been employed since 1936 as superintendent of the coke works and later as assistant superintendent of the blast furnaces.

• **Bruce A. Irwin** has been appointed sales manager of the Hammel-Dahl Co. of Providence, R. I.

• **Louis W. Kempf,** assistant director of research, Aluminum Co. of America, has been elected chairman of the Institute of Metals Div. of the American Institute of Mining & Metallurgical Engineers, New York. He succeeds **E. E. Schumacher,** chief metallurgist for Bell Telephone Laboratories, Inc.

• **J. R. Ferguson** has been named director of automotive engineering of the Packard Motor Car Co., Detroit. Mr. Ferguson has been affiliated with the automotive industry since 1909. He joined Packard, in the company's Truck Div. in 1911 and advanced to truck engineer before promotion to chassis engineer of the Passenger Car Div.

• **Ray Morrissey** has joined the Cross Co. organization at Detroit. Mr. Morrissey, who has been named vice-president in charge of sales, has been associated with the Cincinnati Milling Machine Co. for 29 yr. He has been direct factory representative since 1919 and their eastern district manager for the past 20 yr.

• **William Osborne** has been appointed assistant to the general manager of the Automatic Transportation Co., Chicago, a division of the Yale & Towne Mfg. Co. Joining Yale & Towne in 1934, Mr. Osborne became chief accountant at the Detroit division and in 1937 was transferred to the company's executive offices in New York. Since 1941, he has been assistant to the general manager of the Sager Lock works, N. Chicago, another Yale & Towne division.

• **Robert E. Dillon** has been elected to the board of directors of the Sterling Engine Co., Buffalo. In addition to his directorship in the company, Mr. Dillon is also president and general manager of the Lake Erie Engineering Corp., director of the Marine Trust Co. Air Investors, Inc., and several other financial and manufacturing companies.

• **Edward Riley,** vice-president of General Motors Corp., New York, has been appointed to succeed James D. Mooney as group executive in charge of General Motors overseas operations. Mr. Riley will continue his duties as general manager of the Overseas Operations Div.

• **James M. Mead,** manager of the Philadelphia plant of Joseph T. Ryerson & Son, Inc., has been appointed manager of the Ryerson New York steel-service plant at Jersey City, N. J. He will take the place of **Harry W. Treleaven,** who is resigning. Mr. Mead began with the Ryerson company in 1919 and has spent a large portion of his 26 yr in the New York and Newark offices.

• **A. F. Rice** has been appointed Rheem Mfg. Co.'s Pacific coast manager, appliance sales. He has been identified with the appliance industry in the west for more than 25 yr, serving as an executive of Western Stove Co., H. R. Basford Co., Southern California Gas Co. and Occidental Stove Co. **H. W. Angell** has been made district manager for the central and northern California and Nevada district with headquarters in San Francisco. **A. R. Jewell** has been appointed sales representative for the southwest district covering southern California, Arizona and Utah, with headquarters in Los Angeles, and **F. F. Line** will represent the division in Oregon, Washington, Idaho and western Montana with headquarters in Portland.

• **R. C. Schrenk** of Scullin Steel Co.'s sales dept., St. Louis, has resigned.

• **R. W. Campbell** has been appointed superintendent of Coke Div. of the Pittsburgh district, Jones & Laughlin Steel Corp. Mr. Campbell started with J & L as chief chemist at the coke plant, and for the past 18 yr has been superintendent of the Pittsburgh plant. Other changes at J & L's coke plants include the appointments of **F. L. McIntire** as superintendent; **E. J. Heastan** as assistant superintendent, and **F. C. Lauer** as general plant foreman at the Pittsburgh plant. At the Aliquippa plant, **J. J. Cavett** has been appointed superintendent; **W. C. Hall,** assistant superintendent, and **E. M. Gillespie,** general plant foreman.

• **Irving H. Osborne** has retired as chief engineer of U. S. Steel's Federal shipyards at Kearny and Port Newark, N. J., after 26 yr of service. He will be succeeded by **Robert W. Erickson,** his assistant.

• **Douglas J. Early,** who entered the employ of the Tennessee Coal, Iron & R.R. Co., Birmingham, as an office boy 37 yr ago, has been appointed manager of sales. Mr. Early moves up to the newly-created position after 10 yr as manager of sales in the Hot Rolled Products Div., where he is succeeded by **William P. Gideon, Jr. Irvin C. Kinney,** formerly assistant manager of sales in the Sheet & Wire Products Div., has been made assistant manager of sales in the Birmingham district office. **Rudolph A. Goldschmidt** has been appointed manager of sales in the Electrical & Wire Rope Div., **Robert P. McGregor,** manager of sales in the Jacksonville, Fla., district sales office, and **Roy C. Rhodes,** manager of sales in the Charlotte, N. C., district sales office. **Carl O. Parker** has been appointed Tennessee Coal, Iron & R.R. Co.'s farm products agent for Georgia. **Clarence E. Abbott,** vice-president of the company, has retired.

• **E. J. Wedge,** superintendent of the aircraft engine building of Ford Motor Co. during the war, has been named general superintendent of the Ford Highland Park plant. **Harold Robinson,** previously superintendent at Lincoln and holder of various other executive posts, has been named general superintendent of tractor manufacturing and assembly at the Highland Park plant.

• **Lt. Com. Charles S. Silsbee,** formerly of Dearborn Chemical Co.'s Marine Div., has been released from service and has again joined the Dearborn staff as the new head of the Marine Div. with headquarters in New York. **Arnold J. Reardon** has joined the staff of engineers of the Dearborn Chemical Co., Chicago.

• **John P. Clark** has been appointed sales engineer of the Ajax Electric Co. He will work out of the Philadelphia office and cover Eastern Pennsylvania, Southern New Jersey, Maryland, District of Columbia, Virginia and North Carolina.

STEWART S. CORT, manager of sheet and tin plate sales, Bethlehem Pacific Coast Steel Corp.

• **Stewart S. Cort** has been appointed the first manager of sheet and tin plate sales on the West Coast for the Bethlehem Pacific Coast Steel Corp., San Francisco. Mr. Cort has been with the Bethlehem Steel Co. in Pennsylvania since 1937, and in 1939 was made supervisor of commercial research on the Pacific Coast. During the war he was manager of scheduling for the West Coast mills of the company, and during the past year returned to Bethlehem to work in the sheet and tin plate sales dept. there.

• **Lt. Col. Arthur L. Bushman,** after 40 months' service in the Army Corps of Engineers, has taken a position with the Firth-Sterling Steel Co., in its New York and Philadelphia offices. Prior to entering the service he had spent 17 yr with the Crucible Steel Co. of America.

• **Dr. R. S. Jane,** who for the past 3 yr has been director of the industrial research dept. of the Shawinigan Water & Power Co., Montreal, has been appointed vice-president in charge of research of Shawinigan Chemicals Ltd. **C. M. Carmichael,** manager, Stainless Steel & Alloys Div. of the company, has been appointed vice-president.

• **John H. Bryan, Jr.,** recently released from the Army, has become associated with J. Harvey Bryan Co., New York, district representatives for Apollo Steel Co., Bliss & Laughlin, Inc., Connors Steel Co., Page Hersey Trading Co., and Thomas Steel Co.

• **Harold A. Anderson,** eastern district manager of the Austin Co., Cleveland, **Charles W. Payne, Jr.,** Chicago district manager, and **Richard Ellis,** district manager in the Pacific Northwest, have been appointed vice-presidents of the company.

• **James R. Downing** has been appointed director of research at Cook Electric Co., Chicago.

• **Clarence L. Smith** has been appointed Detroit district manager for the Grinding Machine Div. of Norton Co., Worcester, Mass. He succeeds **Oscar A. Knight** who retires after over 40 yr service with the company.

• **George E. Miller** has been made assistant sales manager of the Machine Div. sales dept. of Osborn Mfg. Co., Cleveland. He was formerly vice-president in charge of sales and engineering for the Smith Power Transmission Co.

• **Robert M. Zeller** has joined the Aetna-Standard Engineering Co., Youngstown, as roll engineer in the Roll Sales Div. He was formerly with Carpenter Steel Co. **Carl R. Wood** has been appointed to succeed Ralph D. Lane as purchasing agent for the company.

• **William H. Stenger** has been appointed Pittsburgh district manager of Firth-Sterling Steel Co., McKeesport, Pa. He has been transferred from the New England district and succeeds Lloyd R. Clowes.

• **Dr. Stewart G. Fletcher** has been engaged by Latrobe Electric Steel Co. as chief research metallurgist to direct an expanded research program, with headquarters at the Latrobe, Pa., plant.

• **Cleo E. Gustafson** has been appointed superintendent of the Gary, Ind., plant of the Union Drawn Steel Div., Republic Steel Corp., succeeding **George E. Yarnold,** who has been transferred to a similar plant in Los Angeles, recently acquired by Republic.

WALTER BENDER, president, General Fireproofing Co.

• **Walter Bender** has been elected president of the General Fireproofing Co. of Youngstown, succeeding George C. Brainard. Mr. Bender came to work for the General Fireproofing Co. in 1918, and was made vice-president in charge of operations in 1936, the position he now leaves to become president.

• **Dr. Arthur H. Grobe** has been appointed chief research metallurgist of the Vanadium-Alloys Steel Co., Latrobe, Pa. Dr. Grobe was formerly with the metals research laboratory of the Carnegie Institute of Technology.

• **Marion H. Freedman** has been appointed division manager of the Seattle office of Columbia Steel Co., a U. S. Steel Corp. subsidiary, succeeding **E. J. Howay,** who has retired after 39 yr of service with the corporation. Mr. Freedman started with the Columbia Steel Co. in 1920 as a salesman, specializing in tubular products. Subsequently he was advanced to the positions of assistant manager of sales and manager of sales. In his new post, he will have charge of the company's sales activities in the state of Washington.

• **W. Morrison** has been appointed sales manager of the Brooks Oil Co., Cleveland. **Thomas M. Stonerod** has been appointed Pittsburgh district manager of the company, and **Joseph A. Rigby** has been made chief engineer.

• **J. Russell Harrahill,** formerly general superintendent of Colt's Patent Firearms Mfg. Co., Hartford, Conn., has been appointed engineering assistant to Theodore F. Lynch, general plant manager of the Marlin Firearms Co., New Haven. Prior to his association with Colt, Mr. Harrahill was master mechanic for the Automatic Screw Mfg. Co., and salvage engineer for the Harvey Machine Co., both of Los Angeles.

• **A. W. Kremser** has been named branch manager of the Davenport, Iowa, office of the Allis-Chalmers Mfg. Co., Milwaukee. Mr. Kremser has been with Allis-Chalmers since 1924, and was formerly connected with the firm's Chicago office as field engineer. At Davenport, he succeeds **C. J. Schutty,** who is being transferred to the company's Kansas City office. **Lt. Com. Max L. Murdock** has returned to the Allis-Chalmers Mfg. Co. as assistant manager of the centrifugal pump section at the firm's Norwood, Ohio works, after serving 4½ yr in the Navy.

• **Alden H. Emery** has been elected secretary and business manager of the American Chemical Society, New York. A former official of the U. S. Bureau of Mines, Mr. Emery succeeds **Dr. Charles L. Parsons,** who has retired after serving the Society as secretary for 38 yr and as business manager for 14 yr. Mr. Emery has been the Society's assistant manager since 1936 and assistant secretary since 1943.

• **Edward W. Gamble, Jr.** has been appointed sales assistant to the president of Monsanto Chemical Co., St. Louis. From 1922 until 1942 he was a sales and administrative executive of New York brokerage and investment banking houses, and through much of the war period served as an officer of the Office of Strategic Services.

• **Huston Brown** has been elected to the presidency of the Joyce-Cridland Co., Dayton, and will continue as director of sales. **J. M. Switzer,** former president, has been named chairman of the board of directors. **Kert Hott** has been elected vice-president and secretary, and **Warren Webster,** vice-president and treasurer. **Merle P. Smith** has been made general manager.

• **Martin J. Brophy** has been appointed general manager and assistant treasurer of Richard Ore Co., Wharton, N. J. **H. Leon Frantz** has been appointed treasurer of the company.

• **John C. Barnes,** former manager of the National Radiator Co.'s Washington branch, has been appointed branch manager for Philadelphia, and **Huber F. Seltzer** replaces Mr. Barnes as manager of the Washington branch.

• **Dr. Locke White, Jr.,** formerly employed in research on chemical warfare devices at the Naval Research Laboratory in Washington, has become a member of the staff of the Southern Research Institute, Birmingham.

• **Norman K. Haig,** formerly director of the General Motors Corp. war products training service, has been appointed director of the government sales section of the distribution staff, with headquarters in Detroit.

• **Albert M. Willett** has been appointed purchasing agent and **Claude B. Kershner,** assistant purchasing agent of the Phoenix Iron Co., Phoenixville, Pa. Mr. Willett has been with the company since 1936, and for the past 4 yr has been traffic manager.

• **Charles E. Schutte,** previously on body engineering work for Hudson and Ford, has been appointed asistant chief engineer of the Body Div. of Willys-Overland Motors, Inc., Toledo.

• **Noel K. Lindsay** has been appointed first director of the British Non-Ferrous Metals Federation. He has been a Conservative member of Parliament, and served in the British Army during the war.

• **C. Fred Watkins** has joined American Swiss File & Tool Co., of Elizabeth, N. J., as traveling factory representative.

• **Horace B. Helm** has been appointed fuel engineer for the Chicago district plants of Youngstown Sheet & Tube Co. **J. H. Vollmer,** formerly of the Youngstown district, has been appointed superintendent of the conditioning dept. at Indiana Harbor, Ind.

• **Howard L. Clary,** formerly manager of sales promotion, has been appointed assistant general sales manager of the Norge Div. of Borg-Warner Corp., Detroit. **E. J. Kanker** has been made director of market research; **E. R. Bridge,** merchandise manager; and **C. H. MacMahon,** director of advertising and public relations.

• **John W. Dixon** has been made treasurer and controller of the Cleveland Graphite Bronze Co., Cleveland, and **William G. Laffer** has been promoted from planning manager to works manager.

• **John W. Leslie,** president of Signode Steel Strapping Co., Chicago, has been elected a director of American Foundry Equipment Co., Mishawaka, Ind.

• **Edgar Kaiser,** eldest son of Henry J. Kaiser, has been appointed vice-president and general manager of Kaiser-Frazer Corp. He will make his headquarters at the Willow Run, Mich., plant.

• **J. T. Llewellyn,** formerly president, Chicago Malleable Castings Co., has been elected chairman of the board. He is succeeded as president by **W. L. Beaudway,** formerly executive vice-president. **L. J. Wise,** formerly assistant to the executive vice-president, becomes assistant to the president; **L. F. Hartwig,** formerly works manager, has been made general manager, and **O. P. Fahrenbach,** formerly assistant to the works manager, becomes works manager.

• **Dr. W. A. LaLande, Jr.** has been appointed director of Whitemarsh research laboratories of the Pennsylvania Salt Mfg. Co., Philadelphia. He came to Pennsalt in 1944 as director of the Research Div. In his new position, he will have charge of all activities at the new Whitemarsh research laboratories except those of the Patent Div.

• **James C. Barnaby,** consulting engineer of Worthington Pump & Machinery Corp., has been transferred to the general engineering staff at the Harrison, N. J., works as assistant director of research and development.

• **Kenneth B. Halstead,** general solicitor for 23 yr, and **Alfred T. Duffield,** assistant secretary of U. S. Steel Corp., New York, have retired.

• **Raymond M. Maloney** has been appointed N. E. sales representative of the Corbin Screw Div., American Hardware Corp., New Britain, Conn. **Carl M. Heller** has been appointed the sales representative of their standard products in the territory embracing eastern Massachusetts, Rhode Island, Maine, New Hampshire and Vermont.

• **James D. Mooney** has resigned as a vice-president and a member of the board of directors and of the administration committee of General Motors Corp., New York, and will devote a part of his time as chairman of Technical Managers, Inc. **E. F. Johnson** has been elected a member of the board of General Motors.

• **Stewart A. Huge** has been appointed manager of production planning, succeeding **L. H. Skougor** of Continental Can Co., New York. Mr. Skougor, now technical assistant to vice-president in charge of manufacturing, will continue to represent Mr. Egenolf in correlating the activities of the production planning, industrial engineering, and industrial accounting programs. **William B. Tate** has been appointed production control manager of the Memphis plant. **Walter F. Reinke** has been appointed superintendent and assistant plant manager of Continental Can Co.'s Cameron plant. **H. F. Campbell,** formerly general line representative in the New Orleans district, has been appointed general line district sales manager with headquarters at Atlanta. He takes the place of **Walter Hitchcock,** who has resigned. **Leonard Cannella** and **L. C. Bohs** have been appointed assistants to J. I. Donahue, New York district sales manager; **Robert S. Hatfield,** is now assistant to J. E. Baldwin, packers can sales manager of the Eastern district; and **George Dohn** has been appointed sales office manager of the New York district.

• **John J. Gillis,** vice-president and general manager of sales, Spencer Wire Co. of West Brookfield, Mass., has resigned. **Samuel C. Avallone** has been appointed general manager in charge of sales and will also serve as chief metallurgist of the company.

G. D. MOOMAW, general manager, Rustless Iron & Steel Div., American Rolling Mill Co.

• **G. D. Moomaw** has been named general manager of the Rustless Iron & Steel Div. of the American Rolling Mill Co., Baltimore. Mr. Moomaw was vice-president and general manager and a director of the Rustless Iron & Steel Corp. which was merged with Armco on Jan. 1. He also had served as works manager for 3 yr after coming to Rustless in 1939 from the Crucible Steel Co., and he was elected vice-president in charge of operations in 1942. **C. R. Hook, Jr.,** has been appointed assistant to the general manager of the Rustless Iron & Steel Div. and has been elected assistant secretary of the American Rolling Mill Co. **Frank Buffo,** who has served as production manager at Rustless since coming with the company in 1930, has been named manager of stainless bar and wire sales of the Rustless Iron & Steel Div.

• **George C. Crewson, Jr.** has been appointed exclusive representative in the Chicago area for the Automatic Temperature Control Co., Inc., Philadelphia.

• **Fred J. Woodburn** has been appointed manager of pig iron sales of the American Steel & Wire Co., and **G. W. Crowl** has been named assistant manager. The new division will be located in Cleveland about Feb. 1, but until space is available, Mr. Woodburn will continue in Pittsburgh.

• **Frank E. Nutt** has been named assistant sales manager of the Crocker-Wheeler Electric Mfg. Co., division of Joshua Hendy Iron Works at Ampere, N. J. He has been replaced at his former post as manager of the company's Washington office by **A. M. R. Lawrence.**

• **Fred Albrecht,** treasurer and a director of the Lodge & Shipley Machine Tool Co., Cincinnati, has retired from active duties. He began his association with the company in 1906.

• **David H. McIlvaine** has been appointed director of public relations of the ACF-Brill Motors Co., New York. In addition to specializing in the field of public relations, he will also assist in various phases of sales promotion and in the company's advertising program.

• **W. M. Walworth** has been elected vice-president and chief engineer of the Mack Mfg. Corp., New York. He joined Mack in 1939, coming to the truck manufacturer after 12 yr in the engineering dept. of Reo Motors, Inc., at Lansing, Mich.

• **J. T. Weissenburger** has been appointed manager of the parts dept. of Cooper-Bessemer Corp., Mt. Vernon, Ohio.

• **Robert M. Whitney** has been named assistant advertising manager of the Automatic Transportation Co., Chicago, division of the Yale & Towne Mfg. Co., filling a new position created for the supervision of the firm's newly-founded advertising and public relations programs.

• **Allen Hurt** has joined the Ohio Stainless Steel Co., Cleveland, as sales manager. He had been associated with the Baltimore Valve Co., Eastern Rolling Mill Co., and Federal Telephone & Radio Corp.

• **Lee C. Wilson** has been appointed sales agent in the Pennsylvania, Maryland and Delaware district of Ross-Meehan Foundries, with headquarters in Reading, Pa. Mr. Wilson is a past president of the American Foundrymen's Assn., and was formerly vice-president and general manager of the Reading Steel Castings Co.

• **Brig. Gen. Hermon F. Safford,** wartime rubber director of the U. S. ordnance dept., has been elected executive vice-president of the Ohio Rubber Co. of Willoughby, Ohio, and Long Beach, Calif.

• **Albert L. Hartley,** formerly chief metallurgist and plant engineer of R. K. LeBlond Machine Tool Co., has been elected vice-president of Federal Fabricators, Inc., and will have charge of engineering research and manufacture of the E. H. Worthington Mower Div.

• **J. S. Gowdy,** for the past 38 months with the Seabees, has returned to the Wyatt Metal & Boiler Works at Houston to become purchasing agent. He replaces **C. L. Williams** who has left the company to enter business for himself. Prior to joining the service, Mr. Gowdy was connected with Wyatt Metal & Boiler Works in their sales and production depts.

• **O. P. Adams** has been appointed director of development, National Tube Co., Pittsburgh. Mr. Adams has been assistant general superintendent of the company's National works, McKeesport, Pa., since 1942. **T. H. Kennedy** has been made assistant general superintendent at National works. **J. Jay Dunn** has retired as assistant to vice-president, operations.

• **Clay P. Bedford,** who built and operated the Kaiser shipyards at Richmond, Calif., has been named vice-president in charge of manufacturing of the Willow Run plant of Kaiser-Frazer Corp. He succeeds **Vern R. Drum,** resigned.

• **Allan Brown** and **G. C. Miller** have been elected vice-presidents of the Bakelite Corp., New York.

• **John C. Whiddett** has been appointed to the post of sales manager of Automatic Temperature Control Co., Inc., Philadelphia. **R. H. Mecklenborg** has returned to the engineering staff of the company and resumes his supervisory status as instrumentation specialist.

• **John R. Hurley** has resumed his duties as president of the Hurley Machine Div. of Electric Household Utilities Corp., Chicago, following 3 yr of Army service.

• **Thomas C. Ford** has been appointed district manager of the Pittsburgh office of Electro Metallurgical Sales Corp., unit of Union Carbide & Carbon Corp.

• **George Mason** has been appointed director of information of American Locomotive Co., New York.

• **C. Q. Wright** has returned to the employ of Whiting Corp., Harvey, Ill., in the capacity of vice-president dealing with special staff work. After holding executive positions with several national organizations, he came to Whiting in 1939 and was vice-president in charge of sales until he left to rejoin the Navy shortly after Pearl Harbor.

• **T. L. Lee** has been appointed district manager of the Agaloy Tubing Co. of Springfield, Ohio, for New Jersey, New York and New England areas with offices located in New York City. Mr. Lee was formerly assistant manager of tube sales for Peter A. Frasse, Inc.

• **A. O. Seehafer** has been appointed general sales manager of Russell Electric Co., Chicago.

OBITUARY...

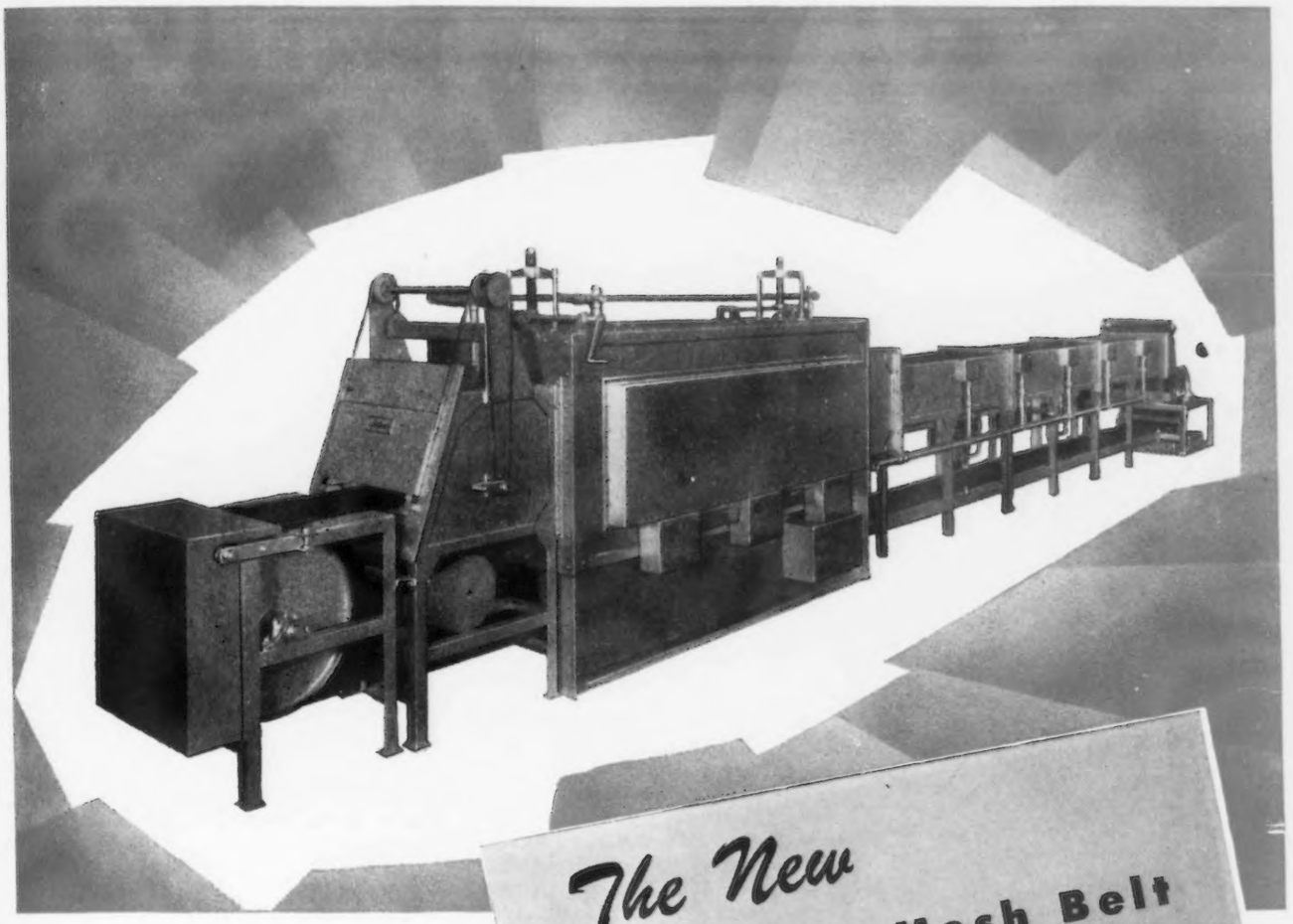
• **John Smith,** 60, former assistant to the general superintendent of the Quincy yard of the Bethlehem Steel Co., died recently.

• **Walter D. Heist,** purchasing agent for the Alan Wood Steel Co., Conshohocken, Pa., before his retirement in November 1945, died Jan. 15.

• **Louis N. McDonald,** general manager of Carnegie-Illinois Steel Co. for more than 50 yr, died Jan. 15.

• **Carl E. Jones,** 71, hand saw polisher and maintenance supervisor of that department of E. C. Atkins & Co., Indianapolis, died recently after an illness of six months. He had been affiliated with Atkins for 22 yr.

• **George W. Cox,** 41, superintendent of industrial relations, Waukegon, Ill. plant, American Steel & Wire Co., died Jan. 7 as a result of injuries from an automobile accident.



The New LINDBERG Mesh Belt Continuous Production Brazing Furnace Multiplies Productivity

Stretch your lead over tomorrow's competition. Produce better products . . . for more people . . . at lower prices with Continuous Production Brazing. This efficient new Lindberg Mesh Belt Furnace is highly versatile. It does low temperature silver brazing, high temperature copper brazing, also sinters powder metals. Employment of Globar heating elements which can be replaced in minutes without cooling down heating chamber eliminates production delays. A selection of atmospheres for handling any type of brazing is available with this furnace. Cooling chamber is water cooled, automatically controlled. Write for complete details.

At the Cleveland Metals Show . . . See

—The Lindberg All-Purpose Brazing Furnace

—Three of our four Controlled Atmosphere Generators

HYCO, HYEN, HYEX } ATMOSPHERE

—The Cyclone Furnace

—The Laboratory Furnaces

Lindberg Sales Engineers will answer your brazing and heat treating questions.

LINDBERG *Furnaces*

LINDBERG ENGINEERING COMPANY

2452 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

SUPER-CYCLONE • CYCLONE • HYDRYZING • BRAZING

Dear Editor:

CONFUSION *IN EXTENSO*

Sir:

You really did a job with the first section of the two-part article entitled "Effect of Work Position in Face Milling," which appeared in the Dec. 6, 1945 issue.

The illustration shown with caption for fig. 9 should have been shown with the caption for fig. 8.
The illustration shown with caption for fig. 11 should have been shown with the caption for fig. 9.
The illustration shown with caption for fig. 12 should have been shown with the caption for fig. 11.
The illustration shown with caption for fig. 13 should have been shown with the caption for fig. 12.
The illustration shown with the caption for fig. 14 should have been shown with the caption for fig. 13.
The illustration shown with the caption for fig. 15 should have been shown with the caption for fig. 14.
The illustration shown with the caption for fig. 16 should have been shown with the caption for fig. 15.
The illustration shown with the caption for fig. 8 should have been shown with the caption for fig. 16.

The complete text, which begins with the first reference to fig. 8, through the last reference to fig. 16, is absolutely worthless and tends to confuse the reader, when we had hoped it would have clarified his thinking in connection with a much misunderstood subject.

A few minutes spent checking proof to determine the correct sequence of illustrations would have meant so much. It really approaches another dilemma like the one referred to on the editorial page.

FRED W. LUCHT.
Development Engineer
Carboloy Co., Inc.,
Detroit

● It's the worst muddle ever to plague this office. In view of the importance of the article, it is being reprinted in entirety herein, on p. 64.—Ed.

"DITHYRAMBIC EFFULGENCE"

Sir:

Frantically jubilant anent the dithyrambic effulgence of Mr. T. W. Lippert's erudite "1945-1946" that burgeoned so vibrantly from the pseudonymic intellectual viscera of your Year Book, the fasciculate profundities generated a zymosis in my bathycolpia.

To the non-brachycephalics, the synthesis of said incomparable syntax will indubitably cascade triumphantly upon their collective cartilaginous tympani. To the azoospermia, those tellurians, whose consequential nebulous and ephemeral status is irrevocably proscribed as a matter of course, the wordy effusion, unfortunately, will merely match the efficacy of a xylopyrographic Gospel in the anterior phlanges of an Ashtaroth. But that is natural. Don't let it get you down.

A sober perusal of the scintillating composition leads me incontinently to the inescapable conclusion that the rhizome of social and labor controversy is a paucity of synteresis. A dearth of synergium, moreover, moves contending factions astigmatically to foster chaos. Mr. Lippert's shrewd analyses, epulotic in portent, will do much toward the circumvention of flashy anarchistic syllogisms, which, adroit in tenor, nevertheless ultimately emulate lethal wommerahs. Horresco referens!

On the other hand, qui vult decipi, decipiatur. The Ghibellines of current disunity, struggling for control of a micrencephalous organization already suffering from diplegia, obviously follows foreign dictation to the extent that they might be logically defined as oecophobiae. By way of contrast the rupisculous principles Mr. Lippert so pedantically advocates are self-evident; they are the pteropaedes of precepts. I traced his multisyllabic incoherence to ebullient enthusiasm, which in no way detracted from the zinziberaceae flavor.

The clarity of his pronouncements precluded nullification; obviously nemine contradicente. We are the progenitors of contemporary confusion; paralleling teknonymy, and blending apotelesm with apocalypse, we should sign ourselves to a possible posterity as Period of Unrest McArmageddon 1946.

Cito naturum, cito putridum rightly describes today's marching cataclysmic events—and I think I am safe in presupposing no error in my catachresis. "Gnothi seauton!" we ejaculate, but there is a frightful discrepancy between our utterances and our apocrypha. The panacea for our figurative ichorrhaemia is more editorial coruscation. Without it, the intelligensia, the jubate and the sans-culotte will readily become trichotillomaniacs —particularly the jubate, if you will overlook a mild play on words.

We have been geophagists long enough. Non semper erit aestas, so we must fight! We are not mus musculus! We are anthropidae!

Yours for a plethora of editorial erudition.

A. PRESTI.
Euclid 17, Ohio

Sir:

After reading Mr. Van Deventer's cordial invitation to "blow our tops," I came to the article "1945-1946," by T. W. Lippert. After sloshing through the first three columns I decided I'd better take advantage of his offer, and suggest that the article be translated into English. It is a good article, of course, from the point of view of content. It took work to prepare the data. The opinions are intelligent. But, man, do you really expect anyone to read it?

ROBERT B. SCHALL.
Manager, Nickel Dept.
Ferro Enamel Corp.,
Cleveland

Sir:

I can't stand the flippant technique used by the editor T. W. Lippert in his review of 1945. This article is very difficult to read; in fact, I quit when I got half way down p. 73. I have read THE IRON AGE for something over 30 yr and I hate to see its editorial tone endeavor to approach the smart-alecky technique of some of our newer magazines.

T. I. S. BOOK.
Works Manager
Winchester Repeating Arms Co.
Div. of Olin Industries, Inc.
New Haven 4, Conn.

Sir:

Turn to p. 72, Jan. 3 issue. Who do you think your readers are? Won't you come down to our level? Most of us are in the iron industry and who here would understand that drivel. Your once happy family is certainly hurt by your being so uppish. We don't talk that way in the shop. It just ain't the language we understand. I'm a shop man and I don't know "them" words. Of course they are in the unabridged dictionaries, but who would have them in the shop.

VICTOR N. CRASNOFF.
East Alton, Ill.

● The unanimity of opinion is that the editor was mumbling in some unintelligible manner to himself.—Ed.

SOURCE OF CORK

Sir:

On the page "News Front" for the June 28 issue, we find information regarding a special type of cork composition as being advantageously used in hydropress forming of aircraft parts. We would like to know where that cork composition is made, as friends of ours, cork growers and exporters in this country, would only be too glad to supply cork under any preparation whatever to the makers of that cork composition.

NOGUEIRA LIMITADA
Apartado (P.O. Box) No. 457,
Lisboa, Portugal

● The special type of cork composition is manufactured by Armstrong Cork Co. There was an article in the June 28 issue, copy of which we are enclosing, which we believe will be interesting to you in case you have not already seen it.—Ed.

POWDER METALLURGY

Sir:

I wish to inform you that I am writing a book on powder metallurgy in which I shall refer to the article "Sintered, Forged and Rolled Iron Powders" by Claus G. Goetzel, published in your issue of Oct. 1, 1942. I have in mind to reprint some of the tables from Dr. Goetzel's article, and therefore ask your permission to do so.

HENRY H. HAUSNER
155 Riverside Drive,
New York 24

● Permission is granted.—Ed.

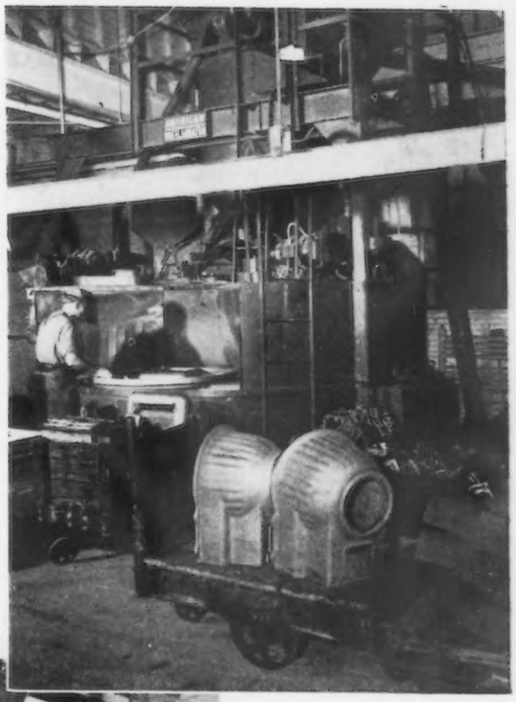
AIRLESS *Wheelabrator* CAN REDUCE YOUR *Waste* LINE

The size of your plant "waste" line directly affects not only the size of your profits but also your ability to complete on a favorable basis.

A frequent contributing factor in swelling expense bulges is inefficient cleaning . . . a condition that nearly 3000 plants have solved with Airless Wheelabrators.

This modern cleaning method is extremely fast, economical and efficient. The Wheelabrator unit throws a storm of more than 280,000 shot or grit per second that no sand or scale can resist.

Result: Unusual savings in time, money, manpower, horsepower, and floor space . . . a minimum of breakage . . . products are scoured lustrously clean . . . faster machinability with less tool grinding . . . simplified work-inspection. If these are the advantages you want in your own business let us show you in black and white how a Wheelabrator will quickly pay for itself out of savings.



A one-minute cycle through the No. 3 Wheelabrator Table is sufficient to remove foundry sand from stove plate and furnace castings. Many tons of castings of the type shown in the picture above are cleaned daily in the rough stage and prior to enameling.

HOW IT WAS DONE AT GUELPH STOVE COMPANY

Guelph Stove Company, one of the leading Canadian manufacturers of stoves and furnaces, eliminated costly waste in the cleaning room by installing a No. 3 Wheelabrator Table and a 27" x 36" Wheelabrator Tumblast to handle their entire production.

In addition to removing sand from castings in the green stage, both machines are used for cleaning preparatory to enameling. (See illustrations at right.)

Twelve tumbling mills were eliminated . . . breakage of fragile stove parts became a thing of the past . . . production capacity was increased using only a fraction of the former floor space . . . and cleaner working conditions were maintained.

This 27" x 36" Wheelabrator Tumblast, operating nine hours daily, cleans all of the small stove and furnace parts. Loads weighing several hundreds of pounds each are cleaned in from two to six minutes.

Notice the bright, clean, silvery appearance of the Wheelabrated castings in the conveyor of the 27" x 36" Wheelabrator Tumblast. This load of gray iron castings was cleaned in just four minutes.

American FOUNDRY EQUIPMENT CO.

510 S. BYRKIT ST.
MISHAWAKA, IND.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

1167

This Industrial Week . . .

- **Steel Strike Picture Looks Long and Bitter**
- **Government May Expand Price Offer**
- **Steel Ingot Rate Down to 7 Pct**

UNLESS the Administration finds some new basis upon which negotiations in the steel-labor controversy can be resumed, the current nationwide steel strike, largest in the country's history, will be long and bitter. Chances of such a move this week on the part of the Administration seem even less than slim.

Government advisers are toying with two principal methods of attack. The more immediate one is said to be a liberalized pricing policy. THE IRON AGE has been told that the "price situation is open at both ends." By this it was meant that neither the $2.50 per ton increase on steel products on which Price Administrator Chester Bowles once firmly stood, nor the $4 increase said to have later been approved by the President is any longer a limiting factor. Reports have been current that a "bait" of $6 a ton in an attempt to assure acceptance of Mr. Truman's 18.5¢ hourly wage increase has been talked over.

The only other alternative for the Administration, if it wishes to play a major part in stopping the strike, would be seizure of the steel industry—a move fraught with danger for the government. Such an action would not necessarily mean the strike would be settled or that the entire problem would not be reopened again at a later date.

The serious aspect of the current impasse which has caused the steel operating rate this week to reach its lowest point in recorded statistics is that both sides now seem farther away from an agreement that at any time since demands were made and rejected.

The steel industry feels that the 15¢ an hr offer was more than a just basis for settlement. Most steel officials other than U. S. Steel Corp. officers still hold to the belief that 12.5¢ an hr is an adequate increase in view of the earnings of the steel industry, even with a compensatory price adjustment.

THAT the U. S. Steel Corp., which is an important part of the solid front presented by the industry, would go any higher than its 15¢ an hr offer is highly improbable, unless an unusual steel price development comes out of Washington. In other words the current controversy looks this week like a fight to the finish.

The steel union having once postponed the steel strike and having accepted President Truman's compromise offer after having stood firm on its 19.5¢ an hr demand is in no position at this time to give ground. It will attempt to win its fight by keeping the mills shut down and adopting the same principle as the industry—an appeal to public opinion by radio and press.

It is probable that in the near future the U. S. Steel Corp. or another steel producer may cancel its union contract. Such an action would be followed by other steel companies. Steel firms have taken the position that the current strike is a violation of the no-strike pledge contained in present contracts which run out on Oct. 15. The union denies this charge.

The cancellation of steel contracts would not only increase the bitterness in the present controversy but would present many more points of difference. If a settlement were to be made on the basis of the present steel contracts, the industry fears that a new strike issue would be raised upon its expiration in October. The wiping out of these contracts would mean a battle on the part of the industry to change present provisions such as maintenance of membership which were based on War Labor Board directives.

An eventual settlement of the steel controversy by way of the steel price method will be anything but simple. A straight across-the-board increase would still leave the small nonintegrated mills at the same disadvantage in which they now find themselves—caused by what they claim to be an unequitable relationship between what they pay for semifinished steel and what they receive for their finished products. A proper price adjustment if it were not to wreck steel sales practices requires painstaking care and complete knowledge of the industry.

THE steel ingot rate this week estimated at 7 pct of rated capacity, down 68 points from last week's revised rate of 75 pct. Current output this week is negligible with only a few plants operating throughout the country.

New order volume this past week was not directly affected by the strike because almost all orders are for shipments to be made several months hence. One major producer has reduced his second quarter quotas for consumers in order to accommodate previously scheduled tonnage which has not yet been rolled. Similar action by other producers is expected. It is understood that the Civilian Production Administration is preparing directives on tin mill products for export and may put the clamps down on the export of other steel items.

Requiring about 300,000 tons of material, including axles, final distribution of the 36,750 freight cars purchased by the French Railway Mission has been made as follows: 8750 20-ton box cars, 4000 30-ton gondolas to American Car & Foundry, 3000 20-ton gondolas to Greenville Steel Car Co., 3000 30-ton gondolas to Magor Car Corp., 5000 20-ton box cars to Pressed Steel Car Co., Inc., and 10,000 20-ton box cars to Pullman-Standard Car Mfg. Co.

• **POLISH RAILROAD ORDER**—Poland is inquiring for 1000 40-ton high side gondolas, railroad circles report. Domestic freight car orders recently included award to American Car & Foundry Co., of 100 auto box cars by Gulf, Mobile & Ohio; 100 50-ton steel sheathed box cars by Pittsburgh & West Virginia; and 25 50-ton steel sheathed box cars by Delaware & Hudson. Baltimore & Ohio has placed orders with Pullman-Standard for two streamlined all coach trains. The trains, each having eight cars, will operate on daylight runs between Baltimore and Washington, and Pittsburgh and Chicago.

• **FREIGHT CARS ON ORDER**—Class 1 railroads on Jan. 1, 1946, had 37,160 new freight cars on order, compared with 36,597 on Jan. 1, 1945, according to the Assn. of American Railroads. Of the total number on order on Jan. 1, this year, there were 13,566 plain box, 3653 automobile box, 4391 gondolas, 13,997 hoppers, 735 refrigerator and 100 miscellaneous cars. There were 471 locomotives on order on Jan. 1 of this year, compared with 468 one year ago. Those on order the first of the current year included 92 steam, six electric and 373 diesel locomotives.

• **ORE SHIPMENTS**—Shipments of Great Lakes ore during 1945 season aggregated 84,800,520 net tons, a decline of 6,110,483 tons under 1944 shipments of 90,911,003 tons, according to L. C. Turner, director of the ODT Waterways Transport Dept.

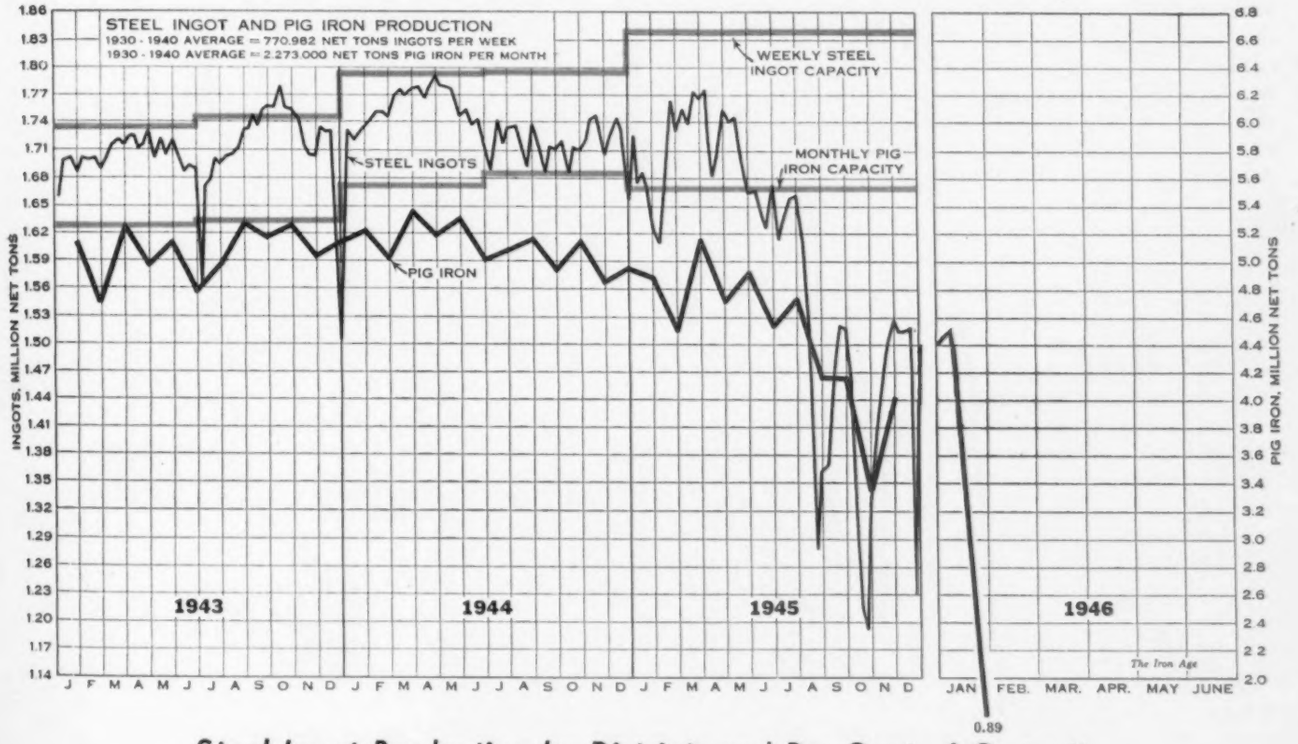
• **SOUTHERN COKE OVENS**—Koppers Co., Pittsburgh, will build a new battery of coke ovens for the Tennessee Coal, Iron & Railroad Co., Birmingham, at the company's Fairfield Steel Works. The new battery will contain 63 ovens of 18.13 tons capacity each and will be known as Battery No. 8. Also Koppers will rebuild Battery No. 7, consisting of 73 15-ton coke ovens at Fairfield Steel.

• **SECOND HAND MACHINE TOOLS**—Representatives of the second hand machine tool dealers met this week with the Office of Price Administration to study proposed revisions to Amendment 9 to Maximum Price Reg. 1 which changed the formula for calculating selling prices of used machine tools on the basis of age. The amendment, effective Dec. 22, 1945, created an unfair relationship in the selling prices of older tools, the dealers claim. Some dealers, who had stocked heavily on older tools in anticipation of selling on the previous formula, were forced to take heavy inventory losses, they state.

• **BUYS REFRIGERATOR CARS**—Purchase of 2000 new railroad refrigerator cars at a cost of about $12,000,000 has been authorized for Pacific Fruit Express Co. by its joint owners, Union Pacific and Southern Pacific railroads.

• **LICENSES TO ACQUIRE**—Abolition of the British requirement for a license to purchase a new motor car has fomented a flood of new orders for the manufacturers, but part of this is discounted as dealer optimism. It is indicated from London, however, that there is a substantial demand for the small 8 and 10 hp models. Promised deliveries remain far in the future for the British domestic market.

• **SCRAP HOLDS FIRM**—Shortages of all grades have served to prevent any market reaction to the steel strike during its early days. Most mills have made arrangements for the receipt of scrap during the shutdown or have asked dealers to stockpile it for them in order not to have it diverted from their operations.



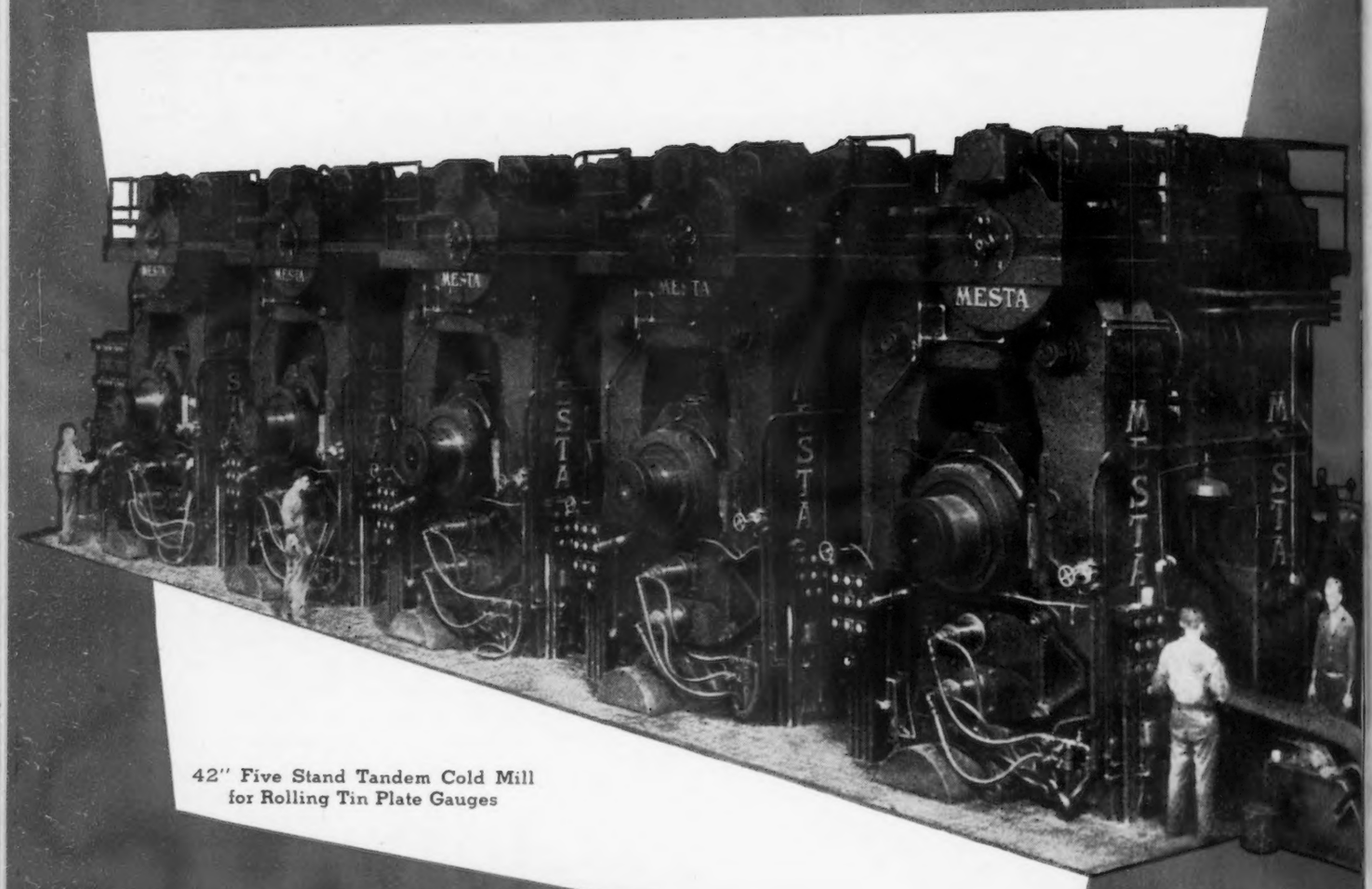
Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
January 15	72.0	65.5*	79.5	70.0	80.0	63.0*	80.0	92.0	96.5*	58.0	93.0	70.0	112.0	74.5
January 22	3.0	8.0	0	0	0	0	52.0	0	24.5	18.0	37.0	14.0	0	7.0

* Revised

MESTA

HIGHER SPEED Four High Tandem COLD MILLS



42" Five Stand Tandem Cold Mill
for Rolling Tin Plate Gauges

First in the industry with the Four-High Tandem Cold Tin Mill, Mesta has constantly maintained its position of leadership, and is building mills with delivery speeds which yesterday were considered impossible. These mills feature new types of drives and control systems which maintain synchronization during acceleration, deceleration and at normal operating speeds.

The Army-Navy "E" Flag
with five stars
flies over the Mesta Plant

BUY VICTORY BONDS

MESTA MACHINE CO., PITTSBURGH, PA.

Administration Seen Seeking an Out On Steel Strike

PROPHETIC: *Philip Murray's serious expression shown here when he recently met newspaper men after negotiations between U. S. Steel and the union broke down in New York probably indicated the slim chance of a wage settlement.*

Washington

• • • **Highly disturbed** over the steel strike with its threat to the industrial economy of the country, the Administration clearly is trying to work out a solution that will bring it to an early end. There are apparently two principal moves underway. The more immediate one is said to point to a liberalized pricing policy. The other is through legislation, underlined by the setting up of Fact Finding Boards, a proposal which President Truman again recommended in his Monday message to Congress on the state of the union. The message also emphasized what the President said was the need for a general increase in the level of industrial wages.

That pricing is uppermost in the Administration's mind as the quickest solution of the strike problem, is indicated by the fact that President Truman last Saturday was in conference with Price Administrator Chester Bowles, at which steel pricing is reported to have been discussed. Giving added force to the report of a more generous OPA attitude on price adjustment was a statement made to THE IRON AGE that the "price situation is open at both ends." By this it was meant that neither the $2.50 per ton increase on which Mr. Bowles once firmly stood, nor the $4 increase, said to have later been approved by the President, is any longer the limiting factor. Meanwhile OPA is going ahead with its plan to issue orders which in effect would require absorption by steel consumers of any price boosts that will be granted.

Coming on the heels of the disclosure of this policy were reports that the Administration was prepared to up the increase to $6, provided that the industry would accept the President's recommendations of an 18½c hourly wage increase. What the reaction of the industry may be to such an offer has not been indicated here. There were reports, however, that even if the price boost were held out to the industry, it would want assurance that new contracts could be negotiated without wartime WLB restricting directives such as those embodying maintenance of membership and closed shop clauses.

That the President is endeavoring to push labor legislation was evidenced further on Monday when he was in conference with Senate and House leaders which is said to have a particular bearing on the steel strike. However, in Congress there is a doubt that the legislation can be enacted soon enough to bring the strike to a quick end.

Also, there is a growing view in Congress that mere fact-finding legislation would be ineffective since both industry and organized labor are opposed to it. Further, it was pointed out that the General Motors Fact-Finding Board decision was rejected by General Motors and the Fact-Finding Board in steel has been inoperative. In addition, the President made his decision in the steel case before receiving a formal report from the Fact-Finding Panel. Moreover, the Senate Committee on Labor and Education has indicated that it will conduct hearings on a fact-finding bill for several weeks. There were reports that the President might ask for legislation requiring compulsory arbitration but here also there is opposition from both labor and industry.

In the event that an early solution to the strike situation does not develop, the administration would probably seize the industry but would do so reluctantly. The present emphasis on price adjustments as a speedy remedy apparently bears out this point.

While the administration's present attitude is against seizure of the industry, there is a minority that favors taking over the industry immediately. The movement for government seizure is said to have been spearheaded by John R. Steelman, special adviser to the President on labor, who participated in the steel wage negotiations. An outstanding opponent to government seizure is reported to have been John D. Small, head of the Civilian Production Administration.

•

New York

• • • **With the government** flirting with the idea of taking over the steel industry but at the same time fearful of taking such a drastic

step because of its ultimate consequences and with steel labor and management as far apart as they were months ago, the nation's most serious strike in its history may develop into a long and bitter affair.

Contrasted with the steel strike of 1919 when labor attempted to gain union recognition and lost its battle, the steel union today has enough power in the form of numerical strength and employee support to keep the steel mills from operating.

The price for this, however, is a loss of pay amounting to about $3,000,000 a day for hourly workers employed at steel producing plants. The total loss, however, is much greater than this because a strike also involves hundreds of other industrial plants which fabricate or further process the steel products obtained from the basic steel companies.

On the other hand the steel consumers in the majority of cases having no more than one week to two week's supply of steel and in some instances even less, steel users if the strike lasts more than a few weeks will begin to exert pressure for some kind of a settlement. They have done so in the past even when they sided with the position taken by steel management.

The settlement made by Henry Kaiser and the CIO was an action which could have no effect upon the steel industry's wage position. Mr. Kaiser's plant at Fontana has a capacity of not more than 750,000 tons a year, was not involved in a strike vote and represents only a small part of the total industry which has established a solid front on the USWA wage demands.

From the record it is clear that collective bargaining in the steel industry has broken down. Statements of Benjamin F. Fairless, U. S. Steel head, and Philip Murray, excerpts of which appear elsewhere in this story, make this point clear. Whether or not the interjection of the government into the situation by its $4 or more a ton price offer and the ill-timed disclosure of the GM fact-finding recommendations stymied the possibilities of an accord between the steel company and the union will probably never be known. According to most steel officials

(CONTINUED ON PAGE 102)

. . . Statements and

New York

• • • The steel industry is now in the grip of a nationwide strike. The result may have serious effects on reconversion. Excerpts from statements made by Benjamin F. Fairless, president, U. S. Steel Corp., Philip Murray, president, United Steelworkers of America and President Truman appear below.

Regrets

• **MR. FAIRLESS**—Your proposal to me in Washington last evening [Jan. 17] that the wage demand of the United Steelworkers of America-CIO be settled on the basis of a wage increase of 18½¢ an hr, retroactive to Jan. 1, 1946, cannot, I regret to say, be accepted by United States Steel Corp.

• **MR. MURRAY** — The international officers of the United Steelworkers of America have advised President Truman that they have accepted his recommendation for a settlement of the current wage dispute in the steel industry and shall recommend its approval by the international wage policy committee of the union.

• **MR. TRUMAN**—I have just been informed that the United States Steel Corp. has refused to accept the compromise offered by me yesterday [Jan. 17] in the United States Steel Corp.-United Steelworkers controversy. It is a matter of great regret to me, and I am sure that it will be to all the people of the United States that all our efforts to avoid this steel strike have up to now failed.

The Blame

• **MR. FAIRLESS**—From the outset, we have recognized how injurious a steel strike will be to reconversion and to the economy of this whole country. Most industries are dependent upon a supply of steel for their continued operations. We have done everything reasonably within our power to avert such a strike. If a strike occurs, the responsibility rests with the union.

• **MR. MURRAY**—The steel industry now has the full and sole responsibility for the strike which must take place 12:01 a. m. Jan. 21. The steel workers in this fight will be combating the sinister forces which seek to stamp out our cherished democracy.

• **MR. TRUMAN**—A strike in the steel industry will be felt in practically every major industry in the United States. It will hamper our reconversion effort. It will stall our attempts to establish a sound economy to which our veterans can return. Its repercussions will be felt all over the country and for a long time to come. I still hope, and on behalf of the great mass of American citizens strongly urge, that my suggestion of settlement be adopted by the United States Steel Corp.

Top Limit

• **MR. FAIRLESS** — As I have tried to make clear to you and other government officials during our conferences in Washington over the past few days, there is a limit in the extent to which union wage demands can be met by us. We reached that limit when we raised our offer to the union last Friday from a wage increase of 12½¢ an hr to one of 15¢ an hour. This would constitute the highest single wage increase ever made by our steelmaking subsidiaries.

• **MR. MURRAY**—President Truman's decision is that there be a general wage increase of 18½¢ per hr to the employees in the steel industry effective as of Jan. 1, 1946. The facts surrounding the pending wage dispute in the steel industry have thoroughly supported the wage demand of the union and completely justified the President's decision.

• **MR. TRUMAN**—I have studied the facts and figures very carefully. The fact-finding board in the steel industry has reported to me informally. It has not had the opportunity to go into the merits of the case very fully, as it would have done if there were legislation now on the books for a "cooling-off" period. Nevertheless, after hearing the board and after long consideration, I believe that the suggestion made by me of 17.1 pct or 18½¢ per hr is fair.

Statistics

• **MR. FAIRLESS**—Under our offer of a 15¢ increase, the average weekly take-home pay of our steel workers for a 40-hr week would

Counterstatements in the Steel Controversy . . .

amount to $51.60, assuming that no overtime is involved. This figure is only $4.54 less than the actual average weekly earnings of these employees, including overtime, in the last full war year of 1944, when the average work week was 46.1 hr. The difference is really less, because we will undoubtedly continue to have overtime in the future, just as we have at the present time. In November, 1945, overtime premiums to our steel workers aggregated more than $1,300,000. Such reduction of $4.54 in weekly take-home pay is the natural consequence of a shorter work week of 40 hr, and therefore one of lower production.

• **MR. MURRAY**—In April, 1945, the last full month preceding VE-Day, the average weekly earnings of steel workers were $56.32. The Bureau of Labor statistics, within the past few days, has reported that the straight-time average hourly earnings for steel workers in October, 1945, were $1.087. It is undisputed that the steel industry is now operating on a 40-hr week without any overtime. This means that at present—assuming that the straight-time average hourly earnings have not fallen since October, which they certainly have due to down-grading and other factors—the weekly earnings for steel workers are $43.48. There has therefore been a slash in the earnings of the steel workers since April, 1945, of $12.84. The wage increase recommended by President Truman will thus provide for a substantial, but not full, restoration of the loss in weekly earnings.

Bargaining?

• **MR. FAIRLESS**—As you know, collective bargaining negotiations with the union broke down at the White House yesterday afternoon [Jan. 17] because Mr. Murray then refused to budge from his position that a country-wide steel strike must take place, unless steel workers are granted a general wage increase of 19½¢ an hr. Our offer of a wage increase of 15¢ an hr was again rejected by the union. The union threatened to go ahead with its program for a national steel strike at midnight next Sunday [Jan. 20]. Although such a strike will be a clear violation of the no-strike provision contained in our labor contracts with the union, which continue by their terms until Oct. 15, 1946.

• **MR. MURRAY**—Since September, 1945, a period of four months, the union has sought—unsuccessfully—to engage in collective bargaining with the steel industry over the union's wage demand for an increase of $2 a day. Twice the United States government, through Secretary of Labor Schwellenbach, requested the United States Steel Corp. to meet with the union in collective bargaining. To all these efforts—the steel industry has given a cold "no." Regarding the statement that the USWA is violating its contract if it strikes I deny this. A clause permitting reopening of the agreement if wage stabilization policy were changed allowed a strike if wage talks collapsed.

Ability To Pay?

• **MR. FAIRLESS**—When the government at the eleventh hour informed us about a week ago of its willingness to sanction an increase in steel ceiling prices, we at once resumed collective bargaining negotiations with the union. Such price action by the government was a recognition by it of the right of the steel industry to receive price relief because of past heavy increases in costs, something which the steel industry for many months has unsuccessfully sought to establish with OPA.

• **MR. MURRAY** — American industry, fattened with war profits, guaranteed a high level of profits through special tax rebates under laws written at their behest, have deliberately set out to destroy labor unions, to provoke strikes and economic chaos, and hijack the American people through uncontrolled profits and inflation. They are determined to accomplish their objective regardless of the risk to our nation.

• **MR. TRUMAN** — I urge the United States Steel Corp. on the ground of the public interest, as well as good business, to accept this settlement.

Cost of Living

• **MR. FAIRLESS**—Since January, 1941, the average straight-time hourly pay, without overtime, of our steel workers has increased more than the 33 pct increase in the cost of living during that period, recently computed by government authorities. Steel workers' wages have kept pace with increased living costs. Such average straight-time pay in our steel-producing subsidiaries was $1.14 an hr in each of the months of September, October and November, 1945, excluding any overtime premium and any amount for correction of possible wage inequities. An increase of 15¢, in accordance with our offer, would raise such average straight-time pay to $1.29 an hr, placing such pay among the highest today in all of American industry.

• **MR. MURRAY**—It is to the interest of all Americans, if we are to provide a firm foundation for an expanding economy of full production and full employment, that the purchasing power of the workers of the nation be maintained and steadily increased. It is with this objective in mind that the CIO and its affiliated unions have been endeavoring for the past year to secure substantial wage increases. If this end is not achieved, the high level of profits of industry will prove to be illusory and our nation will inevitably be plunged into a terrifying depression with all its consequent evils.

Denial

• **MR. FAIRLESS** — My attention has been called to a press dispatch setting forth a statement about me allegedly made by Mr. Philip Murray at his press conference recently. It is a base falsehood that I ever stated to Mr. Murray that I regarded his demand of a wage increase of 19½¢ an hr as meritorious, or that I would recommend favorably to the steel industry the acceptance of such a wage increase. Quite the contrary, I told Mr. Murray repeatedly that such a wage increase was excessive and out of the question.

(CONTINUED FROM PAGE 100)

and some labor leaders the issue was by no means bettered.

The steel industry, showing its lowest profit in history during a time of high operating rates in the last quarter of 1945, had reached a point where it could not bring itself to taking such a chance by meeting the union's 18.5c an hr offer. It had hoped that in some way or other the steel strike would not occur and a wage compromise would be reached.

Now that the shutdown in the steel industry is complete, steel management would have to go back over the whole problem and be prepared to find a way out before reconversion has been completely wrecked. If new settlements are offered which have all the earmarks of those already turned down by the industry, the present struggle will become the bitterest in the history of the industry, according to those close to the situation.

On the union front Philip Murray is gambling with the very existence of the steel union in holding out for what he thinks is a necessary hourly wage increase which will give steel workers an even break in the future inflationary period. If Mr. Murray wins he will obtain an hourly rate higher than any in steel history.

Regardless of the outcome the consumer will pay for the differences of opinion between steel management and steel labor and will also pay for the eventual increase in steel prices which is bound to come after a wage agreement has been reached.

Most sources privately believe that the solution of the steel price-wage controversy will be such that the "hold the line" fight on inflation will be either lost or severely handicapped. They point out that all consumers of steel use steel base prices in figuring the price charged for their products. Furthermore the rise in steel workers' pay will determine the scope of other industrial wage increases.

The steel industry, according to price experts, has a case for higher prices no matter what final adjustments may materialize. Steel prices today are low compared to the prewar levels of other materials. Steel competition, even with a strong union which prevented serious price breaks, is responsible for this.

In 1938 the desire to keep mills going started off a price cutting spree which caused old timers in the steel sales offices to raise their eyebrows. Base prices were shaded as much as $4 and $5 and more a ton. It is argued that a healthy rise in steel prices at this time would take care of higher wages and help compensate for what now looks like red figures in the steel industry.

The desire on the part of some manufacturers to see stringent labor legislation passed as a result of the steel strike may not come to pass in view of Congress' attitude to "take plenty of time."

o o o

CPA Suspends Ratings; Places Steel Warehouses Under Rationing

Washington

• • • **All oustanding** ratings for iron and steel were suspended by the Civilian Production Administration on Jan. 21 and steel warehouses were placed under a voluntary rationing system to insure delivery of a substantial portion of the nation's current stocks of steel to essential needs.

The suspension of all "AAA," "MM" and "CC" ratings was officially authorized by Dir. 13 to Pr. 1. Under this direction every order for items of iron and steel bearing a preference rating which has been placed, or is placed during the period of the strike, must be treated as unrated. However, this does not apply to orders on distributors bearing a rating of "AAA" issued by CPA on or after Jan. 21, 1946.

In cases of an emergency where the filling of a particular order for iron and steel is absolutely essential in the interests of the public health or safety, CPA may issue a specific written directive to a producer or distributor requiring the filling of that order from finished stocks on hand. Alternatively, CPA may assign a rating of "AAA" to an order in this type of emergency. This rating will be valid only against stocks of distributors, and may not be extended to producers.

When Dir. 13 is revoked, presumably when the strike is settled, any portion of an order bearing a rating which has not been filled will again be considered rated as if the rating had never been suspended.

The voluntary rationing system was outlined by CPA in a "declaration of policy" issued to steel warehouses. Under this declaration all steel warehouses, fabricators and others with inventories of steel mill products, who are ordinarily in the business of selling such items, are requested to carry out the following policies immediately:

(1) For all types and shapes of steel mill products—Ration all deliveries so that no customer will receive more than is needed for immediate use and by so doing stretch stocks to last over the longest period possible for those uses for which the items handled have customarily been sold.

(2) For types and shapes of steel mill products ordinarily used for maintenance and repair—When stocks of these products have been reduced to 50 pct of the normal inventory of such products, deliveries thereafter should only be made for emergency maintenance and repair uses which have to do with public health and safety,

Steel Employment

New York

• • • **According to the American Iron & Steel Institute the distribution of steel wage earners (salaried workers excluded) by major districts in November 1945 was as follows:**

Eastern	102,453
Pittsburgh-Youngstown	194,061
Cleveland-Detroit	32,669
Chicago	85,765
Southern	21,986
Western	12,391
Total	449,325

The total does not include many steel plants which come under the "fabrication" classification but does include steel producers, large and small.

such as requirements of hospitals, public utilities and transportation facilities, and for other extremely essential maintenance and repair. This does not include deferrable maintenance and repair nor general maintenance and repair for those industries which will be shut down for other reasons even if they should receive maintenance materials.

The declaration also points out that, "it is manifestly impossible for the warehouses to supply materials in mill quantities to any customers, and industries requiring such quantities for production cannot be kept in operation from warehouse stocks.

"If distribution of existing steel stocks is handled effectively in accordance with the above policies, it should seldom be necessary for the CPA to issue a direction or 'AAA' rating on a warehouse, fabricator or processor to meet specific needs. The CPA would authorize no directions or 'AAA' ratings other than those warranted by extreme emergencies."

CPA Administrator John D. Small in issuing the declaration emphasized that CPA is depending upon the cooperation of steel mill managements, and the local representatives of labor, to make possible the release and shipment from strike-bound steel mills of finished items not available elsewhere and which are needed for emergency purposes. Requests to release steel from such mill stocks will be made only when such shipments have been certified by CPA directives, as necessary to meet serious emergencies in connection with the public health, safety and welfare of the nation.

The Iron Age Districts Annual Steel Capacity

In net tons—000 omitted

Source: American Iron & Steel Institute Directory Compilations by Districts: The Iron Age

District	1945	
	Net Tons	Pct of Total
Pittsburgh	22,521	23.58
Chicago	18,932	19.82
Youngstown	13,208	13.83
Philadelphia	10,784	11.29
Cleveland	4,541	4.75
Buffalo	4,443	4.65
Wheeling	3,320	3.48
Southern	3,701	3.88
Detroit	3,190	3.34
West	5,467	5.72
South Ohio River	2,760	2.89
St. Louis	1,758	1.84
Eastern	879	0.92
Total	95,503	100.00

Steel Strike Fails To Change Planning In Automobile Plants

Detroit

• • • **The start of the** nationwide steel strike this week, which was kicked off here last Saturday by the walkout of the 7000 workers of Great Lakes Steel Corp., a division of National Steel, caused no notable change of planning, schedules or thinking in the automobile plants here.

Ordinarily, a steel strike would have closed down the auto industry in short order, but up to now the resumption of production has barely started. Production has been running below 30,000 units per week, in contrast to the 100,000-plus which could have been expected had not strikes in General Motors, in the flat glass industry and in other supplier plants interfered.

Of current production, more than half is coming out of Ford Motor Co., whose own steel mills are manned by CIO United Auto Workers Union members, and hence are unaffected up to now by the steel workers' strike. Consequently, Ford can be expected to be able to maintain its pace for a period, unless glass shortages cut it down.

Although Ford does not produce all its steel requirements, buying certain shapes and sizes outside, it is believed that enough inventory exists of products not made in the Ford mills to continue output.

Other companies also apparently have been building inventory of fair size since last fall, their car and truck output during that period having run well below the totals indicated by the amount of steel tonnage received.

Feeling here is that the steel strike provides an important weakening of the case of the UAW in its strike against General Motors. Now there is even less reason than before for GM to contemplate settlement of its strike, even though it probably has steel inventory which would enable its resumption whenever a settlement might be reached.

Cleanup of the glass strikes during the past week means that this bottleneck, narrowest of all those which has confronted the auto industry since it started on its production comeback road last fall, has now been eliminated. Reports from Libbey-Owens-Ford and Pittsburgh Plate Glass companies are that several weeks will be required before furnaces can be brought back up to required operating temperatures, and sufficient preliminary runs of glass made to assure uniform quality.

TYPICAL: *This picket line in front of Bethlehem Steel's Lackawanna, N. Y., plant which was shutdown a week ahead of time due to local grievances over maintenance crews, is typical of those now thrown around all plants.*

Bitterness Develops In Westinghouse Strike

Pittsburgh

• • • **Bitterness mounted** this week in the Westinghouse Electric Corp. CIO strike, which started Jan. 15, with charges being hurled by both the company and the union. Westinghouse charged that the union is "out to wreck both the plants of the company and the future jobs of its own members by preventing adequate maintenance and protection," while the CIO-UERMW counter-charged that Westinghouse is "attempting to smash our union and destroy our wage 'standards' ".

Westinghouse estimated that it would take two months to get the plants back into production unless more supervisors and maintenance workers are permitted through the picket lines. Passes from the union for these workers have not been requested, but it has been reported that the union will give the passes if asked.

The CIO called the strike after negotiations with the company failed to produce a compromise. The company offered a 15 pct pay increase for a 10 pct increase in hours. In other words, the company offered a work-week of 44 hr with time and a half pay for the extra hours. This would yield, according to the company, a take home pay of $60.72 a week for the average hourly paid male employee. The take home pay now is $54.20 for this class employee.

Westinghouse stands on its offer and CIO is holding out for its demands. Westinghouse stated that it could not afford to increase pay wages to the extent that the CIO demands, pointing out that its average hourly earnings for male employees totals $1.35 an hr, 15 pct more than the average for 25 major industries according to the National Industrial Conference Board, and substantially higher than its competitors, General Electric and the Electrical Div. of General Motors.

Estimating that a $4 a ton increase in steel prices will cost the company an ultimate of $12,000,000 a yr, the company officials pointed out that an additional wage increase of $2 a day per employee would add another $45,000,000 annually to its costs. Thus, it is feared by company officials that market prices for its products would eventually reach the point that in themselves they would kill the markets that are potentially in evidence following the war.

Further, the company pointed out that on the basis of a $3,750,000 a month wage increase, present profits did not warrant such advance in wages. During November, the latest month for which the company has complete profit figures, the operating profit of the company was only $464,925. This profit alone, if divided among its 90,000 employees, would only result in an increase of $5.17 a month instead of the $42 a month demanded.

Approximately 38 Westinghouse plants have been affected by the strike, and about 90,000 employees are idle. The only Westinghouse activities in operation are two Navy ordnance plants, one near Detroit and the other at Louisville.

USWA Jumps the Gun At J&L Pittsburgh Works

Pittsburgh

• • • **Jumping the gun** by 52 hr on the CIO set strike deadline, the workers of Jones & Laughlin Steel Corp.'s Pittsburgh Works walked off the job at 7:45 P.M. (Friday), Jan. 18. The walkout followed the refusal of Jones & Laughlin to permit union officials access to the plant during the strike. The company and the union had been meeting all afternoon on the question of maintenance employees.

About 700 to 800 employees, which included a considerable number of supervisors, remained in the plant after the walkout started to help bank the blast furnaces and tap out the steelmaking equipment. By midnight Friday, all of the blast furnaces were banked, and by 5:00 A.M. Saturday the last openhearth was tapped. All iron was pigged. Crane operators at the Bessemer department walked out leaving about 500 tons of metal in the hot metal mixer. This was removed without damage later.

All power and boilers at the plant were in operation Saturday, manned by supervisory employees. Coke ovens at Hazelwood were full and plans were made to push them on Saturday. Again, however, the work had to be done by those that stayed in the plant and by supervisory employees.

Machine Tool Builders Have Month's Reserve

Cleveland

• • • **Machine tool builders** will not feel the full impact of the steel strike for at least four weeks, and in some cases, steel reserves are sufficient to carry the companies through the end of March, according to competent observers. This will probably mean that machines slated for shipment during the next nine weeks will go out of the builders' plants on schedule.

By and large, the industry did not stockpile extensively against the eventuality of a steel strike, and will probably continue to draw on warehouses for current operational needs as long as possible. Sources in the trade, however, are dubious of the industry's ability to continue much beyond the first of April without recourse to some substitution and switching of alloys and carbons.

Some observers believe that the steel strike and its possible effect on the production of anti-friction bearings and electric motors, already seriously curtailed, may bring the machine tool industry to at least a brief impasse within the next 30 days by throwing production out of balance.

One major builder in this area, however, whose orders for alloy reflect at mill level, has indicated that his stocks on hand are sufficient for only three weeks' operation.

Booklet Advises On Shipping Steel Goods

Chicago

• • • **Recommendations for** marking and bundling of steel and steel products are contained in a booklet published by the committee on prevention of loss and damage, American Assn. of Railroads.

The railroads have been experiencing difficulty because of loss of markings on steel and the necessity of breaking bands on bundles that are too large for handling at many freight stations.

The bands on many bundles, particularly sheets, are not strong enough and break in handling, according to the association, resulting in loose pieces which go astray. The greatest difficulty flows from the use of tags.

Foremen's Assn. Shows Support to Workers

Chicago

• • • **Cooperation of** the Foremen's Assn. of America in preserving strike conditions dictated by the CIO-United Steel Workers of America proved to be the only surprise of a quiet and orderly walkout at steel-producing plants in the Chicago district.

At no plant did the steel workers jump the gun on the midnight Sunday deadline by more than three hours, and in these cases facilities already had been shut down or continued to be shut down in an orderly fashion as promised by the union. Of the struck plants, only two, Inland Steel Co. at Indiana Harbor and the Gary Works of Carnegie-Illinois Steel Corp. retained blast furnaces on low wind. Carnegie failed to come to terms with the steel workers for operation of two blast furnaces and three coke oven batteries at Gary Works, but these nevertheless continued in operation manned by supervisory employees.

The Foremen's Assn. of America notified Carnegie at 4 A. M. Monday that it would withdraw its members from such operations at 6 P. M., inasmuch as "the CIO had offered to provide necessary workers" and called upon the company to come to terms with the CIO by that time. These operations are necessary to the gas supply of the City of Gary.

No Strike Expected At Steel Foundry

Lebanon, Pa.

• • • **An agreement** between the Lebanon Steel Foundry Co. and its 750 steelworkers to arbitrate the current wage increase demand is expected to prevent any strike at this plant.

A joint statement by T. S. Quinn, treasurer, and Edward Miller, the union's area representative, said:

"An agreement, arrived at after a long conference, provided a mutually agreeable process of collective bargaining for determination of any general wage increase and the effective date of such increases."

NOT WIDESPREAD: *This gas attack on a picket line in Los Angeles recently has not as yet become common and probably will not come to pass in the serious steel strike now underway. Clashes so far in this national tieup have been isolated and have not involved many companies.*

Chicago Steel Users Hold Little Stocks

Chicago

• • • **Steel consuming** industries were stricken with creeping paralysis with the calling of the steel industry strike.

Many steel users were immediately and directly affected. Firms whose business falls under the general heading of steel products, and with whom the United Steel Workers is bargaining agent, were struck along with the steel producers themselves. The overall strike picture among these plants is spotty, for many deal with AFL or independent unions, and a substantial number are not organized by the unions.

For a few days at least, competitors of the struck steel products plants will continue to operate, but the respite will be short. Few inventories are pressing the 60-day limit allowed by the Civilian Production Administration for most products or the 45-day inventory limit for sheet products. It is estimated that lack of steel will first begin to be severely felt about one week after the beginning of the steel strike, with lack of supplies closing nearly all users within three weeks.

Two large firms in the farm equipment industry are closed down by strikes of the United Farm Equipment Worker—CIO International Harvester Co., largest farm equipment manufacturer, was struck Monday with 30,000 workers at ten plants going out.

Aside from the General Motors tieup other automobile producers face a difficult future with steel shortages in their own plants and those of suppliers pointing to a complete shutdown within three weeks. The railroad equipment manufacturers have a similar situation.

Lukens 1945 Income Down

Coatesville, Pa.

• • • **Consolidated net** sales of Lukens Steel Co. and subsidiaries for the fiscal year ending Oct. 6, 1945 amounted to $45,243,988 in contrast to $54,576,770 for the fiscal year ending Oct. 7, 1944.

Operating income for the fiscal year amounted to $41,477 as compared with $955,789 for the 1944 fiscal year. Net income transferred to earned surplus for 1945 amounted to $2,751,477, for 1944.

Working capital at the end of 1945 was $7,570,523, an increase of $2,256,128 over the $5,314,395 at the end of 1944.

Scrap Convention Hears Destruction of Surplus Report Is Unfounded

Chicago

• • • **A record group** of approximately 800 members attended the opening of the 18th Annual Convention of the Institute of Scrap Iron and Steel, Inc., Monday Jan. 21. They were welcomed by Harold Weinstein, president of the Chicago Chapter.

Edwin C. Barringer, president and executive secretary, then submitted a report in which he reviewed the accomplishments of the scrap industry during the war years and proposed a program of progress to be followed during 1946.

The business sessions got under way with a symposium covering "what's ahead for iron and steel scrap and its consuming industries." The subject was introduced by T. W. Lippert, editor, THE IRON AGE, with his discussion of the "general market outlook." Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.; N. Ebersole, American Rolling Mill Co., Middletown, Ohio; J. D. Sloan, Youngstown Sheet & Tube Co., Youngstown; and H. Schultz, Carnegie-Illinois Steel Corp., Chicago, revealed the problems encountered by the foundry industry, blast furnace, openhearth and electric furnace operators, respectively, in the purchase and use of scrap.

Max Kuniansky particularly emphasized that no scrap is rejected by the foundry consumer as "bad scrap," because all scrap is satisfactory for some suitable purpose. For example, stove plate scrap is excellent for use in the blast furnace, but is definitely detrimental for use in the cast iron cupola. H. Schultz pointed out that since the primary purpose of the electric furnace is to produce high grade alloy steels, the presence of undesirable and unknown elements in poorly segregated scrap is harmful to the production of satisfactory steel.

The afternoon session was initiated by Brig. Gen. D. N. Hauseman, GSC, director, Readjustment Div., War Dept., with his report of the relationship of "The Army and Scrap." He declared that $5.5 billion worth of Army goods had been declared surplus within five weeks following VJ-Day, and maintained that the rumors criticizing the "destruction of property" were unfounded, since property has been destroyed on the whole for only three reasons: (1) Public health, (2) public safety and (3) military security.

In introducing the forum on disposal of contract termination scrap and government surplus, C. H. Lipsett, publisher, *Waste Trade Journal* and *Daily Metal Reporter*, deplored the record of surplus disposal. As of January, 1946, $11 billion worth of surplus material was held to be in storage, with the prediction that this figure would grow tremendously. He recommended that the War Assets Corp. seek the cooperation of trade committees in an effort to expedite disposal of surplus war materials. Representatives of the Army, Navy, RFC, and SPA were on hand to answer questions dealing with disposition of surplus scrap materials handled by those respective agencies.

Crucible's Purchases Moved to Pittsburgh

Pittsburgh

• • • **In an effort** toward more complete consolidation of buying activities, the Crucible Steel Co. of America has moved its general purchasing offices from the Chrysler Bldg., New York, to the Oliver Bldg., Pittsburgh.

A. W. Taylor is director of purchases, George B. Newcomer, formerly of Crucible's Midland Works, is purchasing agent, and Regis O. Bridge, of the company's Park Works, is assistant purchasing agent.

All purchasing functions that were formerly handled either through New York or at the plant purchasing offices will be handled by the newly established general purchasing department.

Make Birmingham A Base for Cotton Ties

Birmingham

• • • **The Tennessee Coal,** Iron & Railroad Co. has established Birmingham as a basing point in the sale of cotton ties. The price delivered f.o.b. cars, Birmingham, in carload lots is the same as the price now in effect f.o.b. cars at basing point ports in carload lots. All delivered prices remain subject to applicable OPA ceilings.

Caribbean Bid to Jan. 31

Washington

• • • **RFC has announced** that the time limit for submitting bids on 18,270 gross tons of scrap iron and steel stockpiled by U. S. Commercial Co., an RFC subsidiary, in Caribbean countries has been extended to Jan. 31, from Jan. 15. Catch follow steel strike lede

COMING EVENTS

Feb. 4-8—National Metal Congress and Exposition, Public Auditorium, Cleveland.

Feb. 4-8—American Society for Metals, Statler Hotel, Cleveland.

Feb. 6-8—American Industrial Radium and X-ray Society, Hollenden Hotel, Cleveland.

Feb. 13-14—Steel Founders' Society of America, Annual Industry Meeting, Edgewater Beach Hotel, Chicago.

Feb. 25-28—Annual Meeting, American Institute of Mining and Metallurgical Engineers, Chicago.

Feb. 25-Mar. 1—Spring Meeting, American Society for Testing Materials, Hotel William Penn, Pittsburgh.

Mar. 5-6—Midwest Quality Control Conference, La Salle Hotel, Chicago.

Mar. 20-22—Production Show and Conference, Chicago Technical Societies Council, Stevens Hotel, Chicago.

Apr. 2-5—Packaging Exposition, sponsored by American Management Assn., Public Auditorium, Atlantic City, N. J.

Apr. 3-5—SAE National Aeronautical Meeting, Hotel New Yorker, New York.

Apr. 8-12—ASTE Exposition, Cleveland Public Auditorium, Cleveland.

Apr. 11-13—Spring Congress, Electrochemical Society, Inc., Birmingham, Ala.

Apr. 25-26 — Twenty-ninth AIME Annual Open-Hearth Steel and Blast Furnace and Raw Materials Conferences, Chicago.

May 29-31 — Machine Dealers National Assn., national convention, Claridge Hotel, Atlantic City.

June 3-5—American Gear Manufacturers Assn., Annual Meeting, The Homestead, Hot Springs, Va.

June 24-28—Forty-ninth Annual Meeting, American Society for Testing Materials, Buffalo.

AC&F Receives Biggest French RR Car Order For Box Cars, Gondolas

New York

• • • **France has placed** the largest postwar order yet made for railroad equipment by any foreign government with American Car & Foundry Co. Placed through the Railway Purchasing Commission of the French Supply Council to the United States the order is for 8750 box cars and 4000 gondola cars.

Smaller and lighter than American equipment, the cars present special problems in design and construction to meet European requirements.

The order calls for 4-wheel box cars weighing 20 tons, as contrasted with standard American cars of 40 tons and 8 wheels. Wheels, made of standard chill thread cast iron, will be 36 in. in diam. as compared with American wheels of 42 in. diam.

The box cars will be of yellow pine construction with sliding steel doors and light steel roofs. Journal boxes will be made of malleable iron.

The gondolas, urgently needed for carrying coal, will be of all-steel welded construction weighing 30 tons each. The European type of hook coupler will be used on both the box cars and gondolas instead of the automatic type in use in the United States.

To Build New Car At Dodge-Chicago Plant

Detroit

• • • **Arrangements are** being made with a mysterious syndicate of financiers, variously reported as West Coasters and Detroiters, to build a radically new type of car in the Dodge-Chicago plant used during the war to produce aircraft engines.

Negotiations for acquisition of the plant, probably by lease, are proceeding now in Chicago, but the War Assets Corp. is silent as to who the principals are.

More is known about the automobile itself. It is based on designs and development work done by Preston Tucker, (Ypsilanti) Mich. Engineer formerly identified with manufacture of Miller racing cars and with product engineering work on the Cord car.

The Tucker car, tentatively named the "Torpedo," is built around an entirely new type of powerplant, a hydraulic mechanism whose central pump drives power to satellite engines located at each wheel. The stopping of the central pump automatically provides brakes at the wheels. The principle involved has been in experimental work in Detroit for many years, but in the past a foolproof system has not been achieved.

Some reports link the new Tucker powerplant with Vickers, Inc., large Detroit manufacturer of hydraulic equipment. It is not known, however, whether Vickers development work lies behind the newest potential automobile industry entry.

At any rate, Tucker announced some time ago that a small, two-cylinder engine would provide more than 100 hp to drive his small car upwards of 100 mph on suitable roads. The car, as he envisions it, would sell in the $1000 class.

The main powerplant would be located in the rear. A vestigial hood would be retained at front, to be used as baggage storage. The driver would sit in the center of the front seat, with swivel seats on either side opening out to give passageway to and from the doors. The body would be of aluminum, fabricated like an aircraft fuselage.

o o o

DOWN, NOT OUT: *Shipbuilding in postwar years will not be completely blacked out. Lake boat construction looks pretty dim because of the excellent construction program that was carried out during the war, but many of the ships suitable for ocean going traffic during the war are pretty well worn out and will have to be replaced. Also American shipbuilders will figure largely in rebuilding foreign merchant marines.*

o o o

France Buys $345 Million in Canada

Ottawa

• • • **Canada is steadily** extending its export markets in Europe and already has closed large orders on this account. According to announcement made here, France has become Canada's third largest customer, and it is estimated that purchases by the end of this year will reach a total of $345,000,000. Robert H. Berniere, president of the French Supply Council in Canada, stated that orders for $153,000,000 have been placed since April, 1945, and the rest of the purchases will be spread through 1946. Of the total expenditures France expects to pay $102,000,000 in cash and the remainder will be covered by Canadian credits, terms for which were recently concluded. The proposed French purchases in Canada include:

(1) Industrial equipment, including hardware, farm machinery, machine tools, factory and railway equipment, ships, trucks, planes, construction equipment and prefabricated houses to the value of $170,000,000.

(2) Minerals, chemicals, textiles, pulp and paper, steel and drugs, $32,000,000.

(3) Purchases on behalf of the French Colonies, $10,000,000.

(4) Food and agricultural products for shipment to France and to French North Africa, $92 000,000.

To date French authorities have placed orders in Canada for 18 ships of which eight of 7200 tons to cost $14,000,000 will be built at Sorel and Lauzon, Que., and ten in Vancouver, B. C., to cost a like amount. Also under construction are 140 locomotives to cost $18,000,000 of which 100 will be built in Montreal and 40 in Kingston.

Great Lakes Markets Quonset Warehouses

Pittsburgh

• • • **Using the lessons** of war to help make the peace, Great Lakes Steel Corp. announced recently that it was marketing a line of buildings built on the principle of the Quonset hut. Designed to afford space at an economical price, the building designs simplify warehousing and building problems with economical, flexible, easy-to-erect, fire-resistant Quonset type buildings. The all-steel arch rib building, standardized at 40 ft wide and available in any length in increments of 20 ft, utilizes Stran-Steel erection. They can be assembled with sheet metal screws and the "nailing groove," an exclusive patented feature of Stran-Steel ribs, purlins, studs and trimmers, permit both inside and outside covering to be nailed directly to the Stran-Steel frame.

The building units are provided in single or multiple arch arrangements, permitting a wide variation in plant or warehouse layout. The arch rib framework of 40 ft clear span consists of 6 in. deep Stran-Steel joists curved to an inside radius of 20 ft, and spaced 4 ft on centers throughout the length of the structure. The arch ribs are attached at their base to standard channel shape base plates which are secured to the foundation. Doors are 12 x 12 ft, of the double inside sliding type, complete with frame, track and hardware, and are installed in the middle of end walls. Provisions have been made for projected type, top hung windows and ventilating louvers.

Dept. of Interior Will Take Barbed Wire Bids

Washington

• • • **Enough barbed wire** to extend nearly twice around the earth, bought to protect Hawaii's beaches against invasion and now located on various islands of the Hawaiian group, will be sold by the Department of the Interior as a lot for fencing or other peacetime uses. The 8000 to 10,000 tons of metal in the lot is estimated to comprise 38,000 to 45,000 miles of wire. It is still on its original reels.

Although all of the wire is unused, some is in scrap condition because of long exposure to the weather. The railroad or steamship weight will be accepted as final measurement, the Department stated. The Department will also sell as one lot some 1,151,364 steel barbed wire fence posts, varying from two to ten ft in length, which were bought to string the wire.

Bids for the materials will be received by the Surplus Property Office of the Department of the Interior's Division of Territories and Island Possessions either in Washington or in Honolulu on or before Jan. 28.

Bids for the wire must be accompanied by certified checks for $10,000 and successful bidders must be prepared to pay the remainder of the purchase price within three days after acceptance of their bid. Bids for the fence posts must be accompanied by certified checks for $5000.

France Orders 10 Ships

Vancouver, Canada

• • • **The Burrard Drydock Co.** of Vancouver, has received a contract from the government of France for construction of 10 big coal-carrying ships at a cost of between $12,000,000 and $14,000,000. The orders call for the building of five vessels of 7500 tons and a similar number of 5000-ton ships. W. J. Wardle, general manager, stated that arrangements to start work on the ships are underway, but it may take a couple of months to complete preliminary plans and get actual work underway. This new order will keep the company's North Shore yard busy until August, 1947.

Steel Foundry for Sale

Washington

• • • **RFC is offering** for sale or lease a steel foundry with an annual capacity of 36,000 tons of castings, which has been operated by the Symington-Gould Corp., Rochester, N. Y., and the plant used by the Wright Aeronautical Corp. at Fairlawn, N. Y., for making aluminum castings for aircraft engines.

Texas Plant Put on Block

Washington

• • • **RFC has advertised** for sale or lease the steel plant of the Sheffield Steel Co., Houston, Tex., subsidiary of the American Rolling Mill Co., and the cast armor plant of the Scullin Steel Co., St. Louis.

Automobile Industry Highlights Soviet Reconversion

o o o

• • • **The Russian** automobile and truck industry is one of the main factors in the reconversion program now well under way in that country. The accompanying photos serve as an illustration of the strides made in the Soviet Union in assembly-line mass production methods.

The Yaroslavl Rubber Factory, which has been one of the most important suppliers of rubber, was destroyed by the invading German army. The plant has undergone a rapid reconversion and is now turning out tires for mounting on autos and trucks, as shown in the figure, upper right, at the Stalin Automobile Plant in the Urals.

The illustration, second from the top, portrays the emphasis placed on recovery in metallurgical endeavor, in that parts coming from the heat treating furnaces, the gray iron foundry, the steel and nonferrous foundries, the motor and gear box shops, and others, meet to be assembled on the steadily moving main conveyor at the Stalin Plant.

The completed trucks leaving the conveyor line are being subjected to a rigorous final checkup by the crew of assembly inspectors, figure, third from top.

Rolling steadily from the assembly line, the new trucks file one after the other, lower right picture, past the gate of this pioneer enterprise of the automobile industry in the Urals.

o o o

Industrial Briefs...

• UP FOR SALE—The Middletown, Ohio, aircraft plant, formerly operated by the Aeronca Aircraft Corp. in the production of light trainer type planes, is being offered for sale or lease by the Reconstruction Finance Corp. Built at a cost of $1,142,000, the Ohio project consists of seven buildings that occupy 2½ acres. Two of the buildings are the property of the original lessee, both being expanded when the Middletown unit was built.

• CASTINGS CONSULTANT—Leonard W. Dean, formerly research metallurgist for Illinois Precise Casting Co., has resigned to become a general consultant in the precision casting field. Temporary headquarters are located 5904 West Fitch St., Chicago 30.

• ACQUISITION — Federal Machine & Welder Co., Warren, Ohio, has purchased a 100 pct stock interest in Sommer & Adams Co., designers and builders of special machine tools, for a reported $500,000. According to Malcolm S. Clark, president of Federal Machine & Welder, the acquisition of Sommer & Adams is part of a postwar expansion program. The company will be operated as a subsidiary of Federal Machine & Welder, with Mr. Clark as president.

• INSTITUTE BOOKLET—A glossary with amplifications of units and measurements of the English system in practical use has been written by Walter Renton Ingalls, president of the American Institute of Weights & Measures. This handbook, called "Units of Weights and Measures," sells for $1 per copy.

NO MAIL ORDER APPLIANCES—Still missing from the Sears, Roebuck & Co. general mail order catalog, just issued in its spring-and-summer edition, are washing machines, electric stoves, electric refrigerators, sheets and nylons. Such items as aluminum cookware, electric alarm clocks, minor appliances, heating supplies, radios and steel furniture came back with the Sears midwinter catalog, however.

• CHEMICAL PLANT FOR SALE—A chemical plant at Ironton, Ohio, formerly operated for the Army by the Buckeye Ordnance Works, capacity 8400 tons of ammonia and ammonium nitrate a month, is for sale or lease, according to the RFC. Negotiations for the plant will close on Jan. 25, 1946. The plant has 49 buildings with a combined floor area of about 500,000 sq. ft., on a 739-acre site on the Ohio River.

• CHANGE OF ADDRESS—W. A. Stevenson Co., formerly at 14903 Warwick, are now located in their new offices at 205 Basso Bldg., 7338 Woodward Ave., Detroit 2, Mich.

• NEW SUBSIDIARY — N. D. Devlin, president of the Rotary Electric Steel Co., has announced formation of a wholly-owned subsidiary known as Stainless Products, Inc. The new subsidiary, which will operate in a plant recently acquired in Elizabeth, N. J., will produce stainless, monel, nickel and special alloy containers, retorts, pressure vessels, process and other fabricated equipment for the chemical, oil, food and other industries.

• LIQUIDATION—Hetz Construction Co., Warren, Ohio, have been awarded the contract for liquidating the former plant of the Sheffield Steel Co. at St. Louis. This plant was formerly owned by the Scullin Steel Co. and leased to Sheffield, and recently sold to the Robinson Erecting Co.

• APPOINTMENT—Fors & Savage, Inc., 2832 East Grand Blvd., Detroit, have been appointed representatives of the Gerotor May Corp. of Logansport, Ind.

Contracts Signed With 500 Firms in Machine Tool Disposal Program

Washington

• • • **Establishment of** national and regional advisory committees to coordinate industry-government efforts in disposal of surplus government-owned machine tools under RFC's "approved dealer plan" was recommended by the Metalworking Machinery Industry Advisory Committee on Jan. 15.

At the same time, the War Assets Corp., an RFC subsidiary which administers the machine tool disposal program announced that as of Dec. 31 contracts had been signed with 500 machinery manufacturers, dealers and distributors who will act as agents in resale of government-owned surplus machine tools and production equipment.

Effective Jan. 15, the War Assets Corp. took over the disposal functions of the former Office of Surplus Property, RFC.

In addition to those already appointed, 510 dealers have submitted applications for franchises and these are being screened by WAC Regional Directors who are authorized to make appointments.

Under the dealer-agency program, contracts are entered into between the WAC and qualified persons who act as government agents to sell surplus machine tools through regular trade channels. Machine tools are thus made more immediately available to prospective purchasers. Such sales agencies are granted 12½ pct commission to compensate for costs incurred in locating and selling machine tools involved. No other commissions or discounts are made.

As recommended by the central committee, a machine tool advisory committee will be established in each of the 31 WAC regional offices to handle disposal problems at the field level and to coordinate sales efforts of the dealer agents. These committees would also channel suggestions and problems of national significance to a central committee in Washington, which, in turn, would transmit through the Industry Advisory Committee such matters as may require final determination by the Surplus Property Administration.

It was also recommended that a pass system whereby dealer-agent representatives might enter private or government-owned plants to inspect machine tools available for disposal be used, thus eliminating delays caused by processing machine tools for indefinite storage. A coordinated program for sales procedure and information, whereby prospective purchasers might be kept fully informed of surplus declarations was also recommended by the committee. A subcommittee will be established for the purpose of working out details needed to put these recommendations into effect.

Available for sale as of Dec. 15, according to WAC, were $518 million worth of surplus machine tools and production equipment stored in disposal warehouses, plus $495 million in plant inventories. Surplus sales have gained headway in recent months, WAC said, disposals during October and November having been approximately double those of August and September, with a similar increase during the month of December.

Utilization of normal trade channels is not only expected to expand and amplify the present disposal setup, WAC said, but will broaden sales of machine tools to all levels of industry. The new procedure is expected to improve opportunities of small concerns securing surplus tools.

Progress of the disposal program is reflected by the following figures showing sales against inventories of the past 5½ months:

	Acquired for Disposal (000 omitted)	Sales (000 omitted)	
		Cost to Gov't.	Sold For
Accumulative through June 30, 1945	$214,902	$75,550	$43,934
July	14,673	6,418	3,158
August	13,891	5,647	2,095
September	41,097	5,828	1,996
October	107,170	12,094	5,299
November	146,720	16,467	7,702
December 1-15	121,922	15,440	7,509
Total Through Dec. 15, 1945	$660,375	$137,444	$71,693

Partial List of Machine Tool Dealers Approved by War Assets Corp.

BOSTON

Botwinik Brothers, Inc., P. O. Box 1960, New Haven, Conn.
Reynolds Machinery Co., 303 Eddy St., Providence.
Lyman A. Smith Machinery, 410 Asylum St., Hartford.

(CONTINUED ON PAGE 125)

Army Sheds Scrap Disposal Problems

Washington

• • • **Scrap and salvage** activities of the Army are rapidly coming to an end and Government scrap operations are being centered in the RFC. The year-end report of the Readjustment Div. indicates a marked decline in disposals of scrap since VJ-Day, a relatively stable inventory position, and a drying up of scrap sources.

At present, it is estimated that acquisitions of domestic scrap should reach the vanishing point by the end of the fiscal year. Sources of Army scrap in the order of their importance are: (1) Scrap resulting from the winding up of industrial operations; (2) small amounts from contract terminations; (3) scrap resulting from regular Army housekeeping activities; and (4) demilitarization of equipment (non-flyable airplanes), which accounts for the major portion of the Army's aluminum scrap.

At the end of 1945 the Army had on hand the following amounts of scrap:

Ferrous—93,900 tons. December showed a drop of 40,000 tons.
Cartridge cases—31,450,000 lb
Copper and brass—18,837,000 lb
Aluminum—16,958,000 lb
Other nonferrous—8,399,000 lb

The inventory situation at the end of the year showed only slight variation from stocks on hand immediately following the end of the war, despite a decline in disposals as illustrated by the accompanying table. The major factor in the decline is the fact that the Army has ceased to operate its large wartime industrial facilities.

Admittedly, the Army's biggest problem is centered in aluminum scrap, but unlike the Navy, which is melting its aluminum scrap into secondary ingots, the Army is disposing of it as scrap. Army acquisitions of aluminum scrap are now running at about 40,000,000 lb per month.

The Readjustment Div. points out that large furnaces would be required to melt its aluminum scrap, which would merely result in additional surplus plant installations when the scrap program comes to an end. The Army scrap philosophy is also based on the premise that smelters and refiners are better equipped to do a melting job on Army scrap.

At present, the Army is having little difficulty in selling its scrap at Surplus Property Administration floor prices.

The Ordnance Dept. stockpiling program at Ravenna Arsenal, Ravenna, Ohio, which was instituted as an interim program, came to end with the issuance of the SPA stockpiling regulation.

Currently held at Ravenna are approximately 80,000,000 lb of 70-30 brass slabs, 40,000,000 lb of cartridge cases, 20,000,000 lb of virgin copper and 9,000,000 lb of virgin zinc, which resulted from contract termination inventories. Also held at Ravenna is a stockpile of about 12,000 tons of high alloy steel scrap, segregated as to alloy content. Except for the ferrous scrap, Ordnance cannot dispose of any of the above material, and it is not carried in the Readjustment Div. inventories. Its eventual disposition will be determined by surplus property officials, who will decide whether it is to be sold or held as part of a strategic reserve.

Army Takes Scrap Bids

Chicago

• • • **Bids were taken** by the Chicago Ordnance District for material located at Army warehouses in Bloomington, Ill., including 2595 tons of steel scrap, and 1080 lb of 70/30 yellow brass.

Dispositions of Army Scrap in 1945

	December	November	October	September
Copper & Brass, 1000 lb	6901.7	9843	16,493	28,156
Aluminum, 1000 lb	5846.5	10,682.5	11,868.5	12,698.3
Other nonferrous, 1000 lb	8137.5	7720.5	9644.9	3929.3
Ferrous (Gross Tons)	79,697	143,079	152,708	115,274

MACHINE TOOLS

. . . News and Market Activities

Progress Made at Machine Tool Meeting

Cleveland

• • • **While a litany** of complaints seemed to be the order of the day, some observers feel that the initial meeting of the Metalworking Machinery Industry Advisory Committee, Jan. 15, in Washington, plowed up a good deal of problematical ground; but whether it will be allowed to lie fallow until the dew of enthusiasm is off the surplus machine tool daisy, or whether the Surplus Property Administration will sow some expeditious seeds immediately, is another matter.

In any event, RFC is now considering sending out instructors to all districts to bring about a standard procedure in handling surplus machines, which is not the case at present. Sources in the trade report that the RFC requests currently being used seem to confuse things. About the only thing a dealer-agent can request is the type of machine, which is frequently followed by RFC offering him a machine already in storage, rather than allowing him to pick a machine out of a plant where the equipment has been declared surplus but not yet processed for storage.

For other Surplus Machine Tool news see p. 110.

According to reports, RFC is sympathetic to changing this request procedure if the machines located in the plants are going to storage, and presumably greater effort will be made to dispose of the machines on the spot in the future. At the same time, RFC obviously would like to dispose of the plants and equipment in them as a whole, and does not want the machines sold piecemeal, an objective that has already resulted in equipment being held and nobody using it.

Sources in the trade say that the Army and Navy are taking lots of machines out of plants for their own use, which, aside from the other and perhaps more important considerations involved will further reduce the ultimate surplus which has been variously estimated at 275,000 to 420,000 machines, by either extreme, enough to satisfy everybody.

Many machine tool builders are not busy right now, and as the real surplus develops, some observers believe that rebuilding might prove at least a partial answer to their situation. This brings buying on consignment into focus and in some quarters the feeling seems to be that there should be a directive providing for negotiated purchase because of the great variation in rebuilding costs of individual builders. Obviously, the builder of a jig borer could not work on the same basis as a lathe maker, precluding the possibility of a blanket directive for buying on consignment. The answer probably lies in the negotiated purchase, which might necessitate changing some of the rules; a course of action some observers do not consider likely.

Some sources among the builders indicate that they have lost as much to the surplus as they have gained in new sales, a showing which surpasses many of their expectations. As funds for foreign purchasers slowly become a reality, indications are that in many cases export trade will amount to a comfortable 30 pct of the total business during 1946.

o o o

Impact of Surplus Tools Seen Slight In Chicago Market

Chicago

• • • **New machine** tool sales in this area are holding up better than expected, and some increased activity has been shown following the slump after VJ-Day, local dealers report.

The impact of surplus machine tool sales upon market activity in new tools has been slight compared to predictions of a few months ago. Distributors report a considerable number of inquiries for standard general purpose tools upon which the release of surplus tools was expected to have the greatest effect.

The farm equipment industry continues to provide a large number of inquiries, with several tooling programs underway or in prospect. Acquisition by International Harvester Co. of the government plant at Melrose Park, Ill., used by Buick for aircraft engine production during the war, indicates a substantial tooling expenditure before production of industrial power equipment gets underway there. Harvester's acquisition of the government-owned Republic Aviation Corp. plant at Evansville, Ind., for manufacture of refrigeration equipment and construction of plants at Wood River, Ill., and Memphis, also are expected to provide considerable machine tool business. Deere, Massey-Harris, and Allis-Chalmers are mentioned as being active.

Machine tool buying by the railroads likewise continues heavy. Shop rehabilitation programs have yet to get into full swing, it is felt, and business from this source should continue active for the balance of the year.

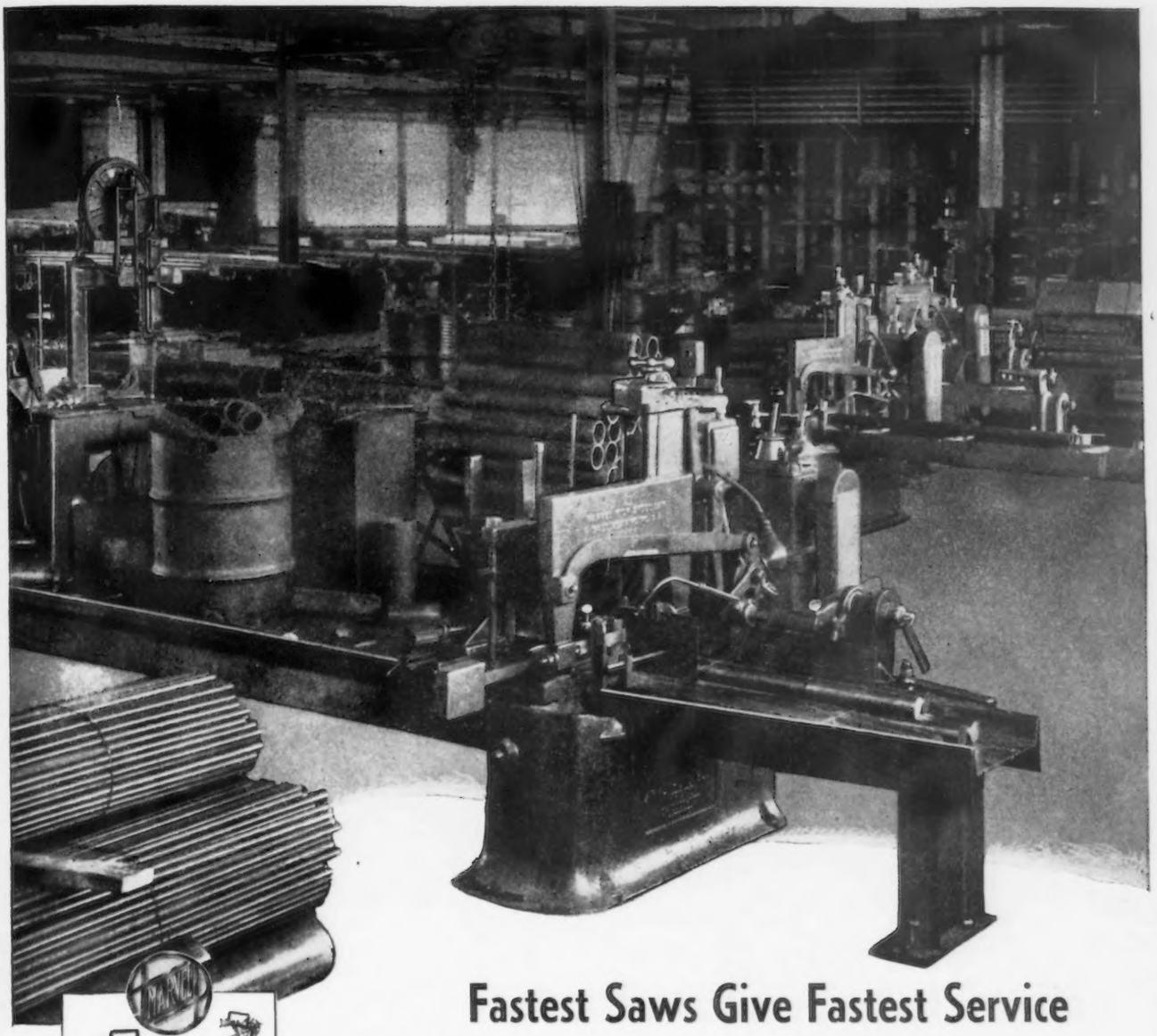
The railroad equipment firms in this area currently are embarked on expansion programs requiring considerable tooling. This field is opening a new market for automatic and semi automatic machinery, with some spectacular installations of automatic welding equipment.

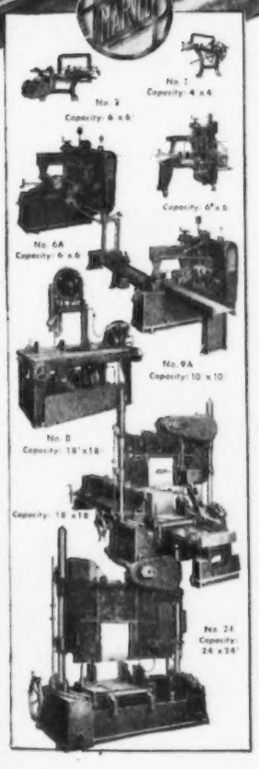
•

Reports Tool Disposals

Washington

• • • **Surplus machine** tool disposals totaled 20,469 units as of Nov. 30, 1945, according to RFC's latest inventory report. Acquisitions covering both RFC-owned tools and those declared by other owning agencies amounted to 99,537 units at that time. Leases accounted for 121, while inventory adjustments (covering display samples, etc.) amounted to 371, leaving an inventory of 78,576.





Fastest Saws Give Fastest Service

With these four modern MARVEL SAWS, the Hamilton Steel Co. of Cleveland is building a reputation for fast service on orders for accurately cut lengths and pieces. They use a Universal No. 8 MARVEL Metal-cutting Band Saw for the big work (up to 18" x 18"), for angle cuts (at any angle in a 180° radius), for notching, mitering and roughing to size and shape. For high speed cutting-off from bar stock up to 10" x 10", they have three No. 9A MARVEL Production Saws. These "fastest saws built" are used for cutting-off single pieces, or with their automatic bar-push-ups, for automatically reducing single or nested bars to slices (as gear blanks) or identical lengths, faster than is possible, with equal accuracy by any other method. With 9 distinct types of MARVEL Metal-cutting Saws; with the positively unbreakable MARVEL High-Speed-Edge Hack Saw Blades; and, with MARVEL Band Saw Blades, the MARVEL System of Metal Sawing has a better way for doing innumerable metal-cutting jobs. If you have a difficult metal sawing problem or just want a saw, MARVEL is your logical source. Write us or check with your local MARVEL Distributor.

For quick reference, see our section in Sweet's File—Mechanical Industries, or write for catalog.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. **Chicago 39, U.S.A.**

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

MARVEL SAWS

NONFERROUS METALS

. . . News and Market Activities

Steel Strike May Ease Requirements for Lead

New York

• • • **Lead continues to be** a critically short metal and the strike of lead miners at Mexico is expected to aggravate a market which is already seriously handicapped by inadequate world supplies and a rapidly growing demand for reconversion needs.

The steel strike is expected to result in some curtailment of the order backlog for there should be lessened demand for annealing pots, and the shutdown of steel fabricators coupled with the prospective strike in the automotive industry is expected to ease the demand for battery lead. There are those in the industry who have seen fit to question the maintenance of the price of lead at the relatively low domestic ceiling price in the face of increases abroad and the payment of government subsidies for a very large proportion of the domestic lead production.

•

Cadmium Controlled Again

Washington

• • • **Reinstitution** of modified controls on the distribution of cadmium was approved by the Cadmium Industry Advisory Committee at a recent meeting. Members agreed with CPA that controls are necessary to prevent a serious impairment of the government stockpile. These stocks have declined progressively, CPA officials reported, from 1,261,300 lb on July 1, 1945, to 908,500 lb on Dec. 1, 1945, and to 846,300 lb on Jan. 1, 1946. A continuation of the present rate of consumption and production, it was stated, indicated that in the absence of restrictive controls the entire government stockpile would be exhausted in less than a year. The annual production rate was estimated at 7,200,000 lb, while consumption was said to be at a rate exceeding 8,000,000 lb annually.

Now CPA controls on cadmium are expected to be on a more modified basis than under the old cadmium conservation order, M-65. Government officials indicated that distribution would be based on a percentage of 1941 use.

•

British Antimony Price Up

New York

• • • **The increase in price** of antimony at London to 22.5¢ per lb is expected to affect the domestic market by siphoning off to European smelters the ore which domestic producers require. This increase of 2½¢ per lb is expected to have a significant effect on the market but observers are not yet in a position to predict developments in detail.

•

AS&R Buys Into Granby

New York

• • • **The American Smelting** and Refining Co. has acquired a minority interest in the Granby Consolidated Mining, Smelting & Power Co., Ltd. it has been announced. The purchase involved something less than 10 pct of the outstanding 450,000 shares. Granby, which is primarily a copper mining company in British Columbia, formerly has had its ores smelted by AS&R. John C. Emison, treasurer of the latter company, has been elected a director of Granby.

•

Canada Sells Copper

Toronto

• • • **Indications** of further improvement in demand for Canadian copper came with the announcement that a deal has been concluded whereby the British Ministry of Supply has contracted to purchase from Canadian producers of refined metal, between 26,000 and 30,000 long tons of copper during the first half of this year, and there is a possibility that the latter figure will be reached. It is further stated that, if Canadian producers have difficulty making up monthly shipment under the contract, they may at their option extend deliveries into July. The price is said to be on the basis of 11¾¢ per lb, U. S. funds.

Demand for lead is increasing at a rapid rate, and production of Canadian lead is to be advanced this year to meet requirements. Output in 1945 was 172,728 tons and in 1944 amounted to 152,291 tons. Consolidated Mining & Smelting Co., produces practically all Canada's lead, and therefore is chief beneficiary in the enlarged demand. New sources of supply of lead are being sought in Canada, but so far new mining propositions have failed to indicate much promise.

Demand for zinc, not as strong as that for lead or as promising as that for copper, is satisfactory. Canadian output is finding a ready market.

•

Zinc Continues in Demand

New York

• • • **Zinc demand** continues in high gear although there are indications that with a steel strike of any duration there will undoubtedly be losses in requirements for galvanizing and for brass production, for it will not be long before the secondary effects of the strike are making their influence felt.

Consumption is very good for Prime Western, High-Grade and Brass Special grades. The zinc stockpile at the end of December as reported by RFC totals 260,967 tons, comprising 169,440 tons High-Grade, 70,053 tons Prime Western, 1739 Brass Special and 4085 Intermediate.

•

Reynolds to Acquire Plant

Grand Rapids, Mich.

• • • **Arrangements** have been completed with the Reconstruction Finance Corp. for the leasing of the Extruded Metals Defense Corp. aluminum extrusion plant here by Reynolds Metals Co. The Reynolds Company wll operate the plant under lease for five years, the arrangement carryin an option to buy at an unspecified purchase price. Reynolds will supply working capital and take over the insurance and taxes.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb)	15.00
Aluminum pig	14.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$90-$100
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$109 to $112
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, New York, cents per oz.	71.11
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	7.25 to 10.00
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c.

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 44c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.00
Automobile radiators	7.25
Zincy bronze borings	7.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.00
Brass pipe	7.25
Old rolled brass	6.75
Admiralty condenser tubes	7.25
Muntz metal condenser tubes	6.75
Plated brass sheet, pipe reflectors	6.25
Manganese bronze solids	7.00[1]
Manganese bronze solids	6.00[2]
Manganese bronze borings	6.25[1]

OPA Group 4†

Refinery brass	4.50*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum*

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S	4.00
25S turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S solids	7.25
turnings, dry basis	5.75

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	2.75

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 23¢ per lb.; 90 to 95% Ni, 23¢ per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb. lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25⅛
Electrodeposited	18⅞
Rolled, oval, straight	19⅛
Curved	20⅝
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23⅛
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 100 oz. lots, per oz.	80

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver Cyanide, 100 oz. lots, per oz.	0.6033
Sodium cyanide, 96 per cent, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 89 per cent, crystals, bbls., frt. allowed	6.25

SCRAP

. . . News and Market Activities

Strike Impact Negligible on Market

New York

• • • **The steel strike has** hardly come as a shock to the scrap trade. And there has been little or no modification of market conditions observed by reason of the opening of the strike. The scarcity of scrap is sufficient to have required a great many mills throughout the country to have made arrangements to keep supplies coming in for the duration. There are some exceptions, but few of the larger consumers seem to care to risk a diversion of a portion of their inadequate supplies to others.

Additional Scrap News on pp. 106, 111.

Market observers consider that for a strike of reasonable duration there is likely to be no effect on the present ceiling price structure. A strike of long duration may affect prices but it is pointed out that the generation of scrap from fabricating activities will also come to a halt under these circumstances.

•

PITTSBURGH—Strikes in all major plants halted scrap shipments except in two instances. One mill has arranged for unloading of scrap off property, while another mill, Armco at Butler, is not down. The latter is not a CIO plant. In the Wheeling district, Weirton plants are taking scrap, and the strike in the steel industry may afford these two plants not on strike to work up better inventories.

•

CHICAGO—Strike conditions in the steel industry have caused scarcely a ripple in market conditions insofar as principal consumers are concerned. Buying appears to be virtually unaffected with all grades firm at ceiling. So far as can be determined, no shipments have been diverted out of the district.

•

PHILADELPHIA—Prices of scrap here continue at ceilings despite the steel strike. Some mills have made arrangements to receive shipments during the strike and the supplies which would normally go to the others will find eager takers. Some mills are asking yards to stockpile for them during the emergency.

•

DETROIT—With only scattered countermanding of orders to continue shipments of scrap to steel mills, the picture continues about the same here. Demand is definitely in excess of supply, brokers and dealers, however, are none too certain how long this state of affairs will continue, but on account of the dwindled supply of factory scrap it appears to be matter of little more than academic interest at this time.

BOSTON—Although there have been holdups of shipments, the situation is by no means disturbing. Yards and brokers were doing business with Pennsylvania mills last week and movement of low phos and cast to foundries continues comparatively brisk. Movement to steel mills this week may be severely checked. Unusual interest is therefore shown in 700 tons of unprepared heavy melting steel at Portsmouth navy yard, bids for which will close Jan. 24

•

NEW YORK—The market is in a very unsettled condition because of the steel strike. However the market continues strong, and supplies are very tight. A sale of 2500 tons of unprepared steel scrap and 250 tons of cupola cast scrap is scheduled by the Brooklyn Navy Yard on Jan. 22.

•

BUFFALO—Business as usual was the announced program for scrap yards this week, except that prepared material will be piled instead of shipped to strike-bound plants. Admittedly the supply from industry will drop fast if the steel stoppage is extended, but termination scrap is expected to fill at least part of this gap. So far as can be learned, no steelmaker has made provision for accepting deliveries, but no wave of cancellations is anticipated either. Consequently the trade expects prices to hold all along the line. Shipments to the struck Lackawanna works of Bethlehem were embargoed last week but other consumers jumped at the opportunity to pick up spot scrap at the market.

•

ST. LOUIS—With the strike in the steel industry, the movement of scrap to St. Louis was slowed down, shippers fearing that cars would be tied up too long as a result of the workers going out. Some steel mills are taking shipments on orders, while others are asking that the movement be withheld for the present. A local strike of freight truckdrivers, now in its third week, has halted the movement of scrap from small operators.

•

CLEVELAND—Most of the major consumers in this area and in the Valley are continuing to take shipments, and storing scrap in some cases right in the cars. One major consumer has stopped shipment but indications are that the others will continue until a possible embargo is put in effect.

•

BIRMINGHAM—Scrap is being held at dealers' yards since the steel strike has shut down all plants here. Inventories at some plants are not too low and when operations are resumed enough may be on hand for charging foundry scrap. Movement was not immediately affected.

•

TORONTO—Further tightening in Canadian scrap supply developed during the week when heavy snowfall throughout Ontario added to transportation problems and added another difficulty in handling by dealers. Ceiling prices prevail on all transactions and general shortage is reported in all classes of scrap. Steel mills are drawing heavily on stocks for daily needs, while most foundry interests are resorting to pig iron to fill in for cast scrap and stoveplate. No malleable scrap has appeared on the market for several months.

Overseas Scrap to Stay

Washington

• • • **Best bets are that** scrap from American military equipment will not be returned to America from foreign theaters of war. This view has been given force as the result of reports that an OWMR Committee has recommended against returning the material. The Committee is said to have reported that the cost would be too great, and that the job of salvaging would be difficult because American troops are moving out of Europe and because there are no prisoners of war available.

The OWMR Committee's reported recommendation grew out of a study of a report by a Scrap Advisory Committee which returned from abroad several months ago after making a survey for the War Department concerning the practicability of recovering scrap from American military equipment.

The report, with final recommendations, may be released soon.

Asks Scrap Ceiling Boost

Chicago

• • • **Higher ceiling prices** on iron and steel scrap were advocated before the annual convention of the National Auto Wreckers' Assn., Inc., here recently by Harold Weinstein, Calumet Iron & Supply Co., East Chicago, Ind.

He declared that present ceilings make unprofitable collection and processing of automobile scrap, and that its flow will be retarded unless higher prices are allowed. He mentioned agitation to increase scrap preparation allowances from $3.50 to $5.00 per gross ton on heavy melting grades, and recommended such action to improve scrap collection.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Where asterisks are used on quotations below, this indicates a ceiling price to which must be added brokerage fee and adjusted freight.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	15.00*
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovels, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	24.25*
Cut bolsters & side frames	22.25*
Angles & splice bars	22.25*
Standard stl. car axles	25.75*
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$10.50 to 11.00
Shoveling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast, chem. bor.	$13.06 to 14.15*

Truck delivery to foundry

Machinery cast.	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.82*
No. 1 cupola cast.	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	$13.50 to 14.00
Mixed bor. & turn.	13.75*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	12.50*
Locomotive tires, uncut.	$18.50 to 19.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	22.00*
Steel car axles	24.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	12.00*
Shoveling turnings	14.00*
Cast iron borings	13.00*
Bar crops and plate	$18.50 to 19.50*
Structural and plate	18.50 to 19.50*
No. 1 cast	20.00*
Stove plate	19.00*
Steel axles	18.50*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50 to 21.00
Rails 3 ft. & under	21.00*
Cast iron carwheels	17.50 to 18.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
Shoveling turn.	12.33*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Store plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	14.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$15.00 to 15.75
No. 1 hvy. melting	15.00 to 15.75
No. 2 hvy. melting	14.00 to 14.75
No. 2 bales	12.50 to 13.25
No. 3 bales	8.50 to 9.25
Mach. shop turn.	7.00
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast.	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$13.00 to $14.25
No. 2 hvy. melting	12.00 to 13.25
No. 1 bales	12.00 to 13.00
No. 2 bales	11.00 to 12.00
No. 3 bales	8.00 to 9.00
Mach. shop turn.	4.50
No. 1 cupola cast.	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$10.00
No. 1 & No. 2 hvy. melting	10.00
Elec. furn. 1 ft. und.	$14.00 to 15.00
No. 1 cupola cast.	20.00*

HAMILTON, ONT.

Per gross ton delivered to consumer:

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

Advances over past week in Heavy Type; declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Jan. 22, 1946	Jan. 15, 1946	Dec. 18, 1945	Jan. 23, 1945
Hot-rolled sheets	2.20	2.20	2.20	2.10
Cold-rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.70	3.70	3.70	3.50
Hot-rolled strip	2.10	2.10	2.10	2.10
Cold-rolled strip	2.80	2.80	2.80	2.80
Plates	2.25	2.25	2.25	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c-r strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tinplate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.25	2.25	2.25	2.15
Cold-finished bars	2.75	2.75	2.75	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	2.75	2.75	2.75	2.60
Wire nails	2.90	2.90	2.90	2.55
Rails: (dollars per gross ton)				
Heavy rails	$43.00	$43.00	$43.00	$40.00
Light rails	45.00	45.00	45.00	40.00
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$36.00	$36.00	$36.00	$34.00
Sheet bars	36.00	36.00	36.00	34.00
Slabs, rerolling	36.00	36.00	36.00	34.00
Forging billets	42.00	42.00	42.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.15	2.15	2.15	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (per gross ton)	Jan. 22, 1946	Jan. 15, 1946	Dec. 18, 1945	Jan. 23, 1945
No. 2 foundry, Phila.	$27.59	$27.59	$27.59	$25.84
No. 2, Valley furnace	25.75	25.75	25.75	24.00
No. 2, Southern, Cin'ti	26.19	26.19	26.19	24.44
No. 2, Birmingham	22.13	22.13	22.13	20.38
No. 2 foundry, Chicago†	25.75	25.75	25.75	24.00
Basic, del'd eastern Pa.	27.09	27.09	27.09	25.34
Basic, Valley furnace	25.25	25.25	25.25	23.50
Malleable, Chicago†	25.75	25.75	25.75	24.00
Malleable, Valley	25.75	25.75	25.75	24.00
L. S. charcoal, Chicago	42.34	42.34	42.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 50¢ per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.32
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.00
Foundry coke, prompt	9.00	9.00	9.00	8.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, virgin, del'd	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943 issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

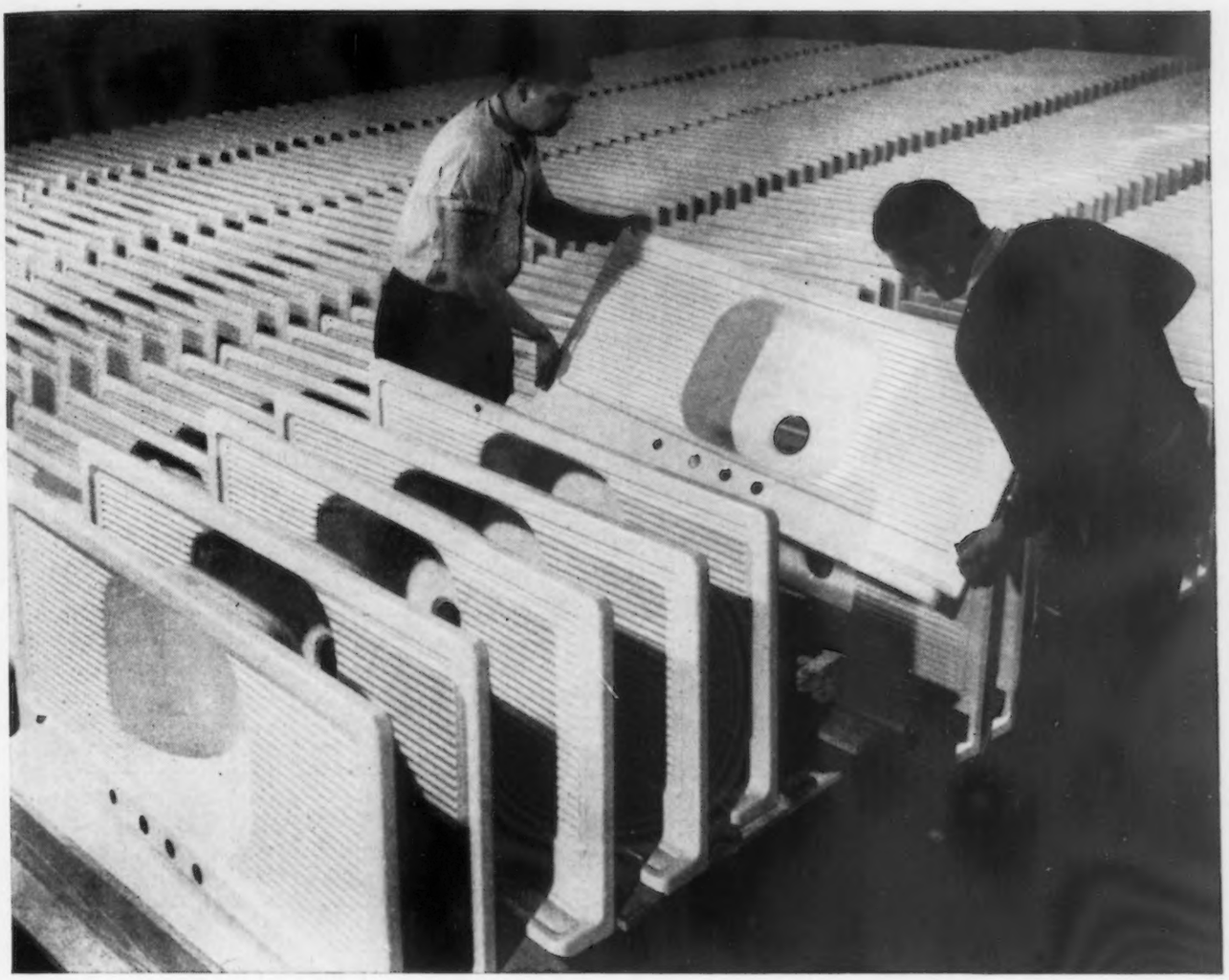
	FINISHED STEEL	PIG IRON	SCRAP STEEL
Jan. 22, 1946	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One week ago	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One month ago	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One year ago	2.38444¢ per lb.	$23.61 per gross ton	$19.17 per gross ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1945	2.44076¢ Oct. 2	2.38444¢ Jan. 2	$25.37 Oct. 23	$23.61 Jan. 2	$19.17	$19.17
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17	$15.67 Oct. 24
1943	2.25513¢	2.25513¢	23.61	23.61	19.17	$19.17
1942	2.26190¢	2.26190¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 8
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 9
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941 issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



What do manufacturers make?

"WHY, anything and everything," you'll probably say.

Right, but that's not all . . .

Every manufacturer who makes a good product also helps make something else . . . *a strong and prosperous United States.*

He does this in a very simple and fundamental way . . . by *keeping men and dollars at work.*

This is the time-tested American formula for gaining and maintaining a high standard of living. By applying it through free enterprise, we have been able to create more of everything for ourselves than any other nation in the world.

Yet, obvious as it is, this idea has frequently been lost sight of . . . sometimes by ourselves in difficult times, more often by other nations who sought to create prosperity by state ediet and government control.

Here at Mullins we manufacture large steel stampings and porcelain enameled products. It is our aim to make a good product, and sell it at a price that will keep men and dollars profitably employed.

This is our small part in maintaining national prosperity, and we feel our responsibility deeply. Every other manufacturer, whether he thinks of it or not, makes his contribution in a similar way.

If you believe this is a sound view of industry, you may be interested in a booklet we have distributed to our employees, "Not by Bread Alone." It discusses, in a simple way, some of our ideas about the true relationship between industry and general prosperity. Your request will bring a copy, and if you think it would interest your own employees, let us know.

MULLINS MANUFACTURING CORPORATION, Salem, Ohio

Mullins

DESIGN ENGINEERING SERVICE • LARGE PRESSED METAL PARTS • PORCELAIN ENAMEL PRODUCTS

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb. to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15c. per lb higher.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($31.00 f.o.b. mill)														
Carbon, forging	$36	$36	$36	$36	$36	$36	$36								
Alloy	$45	$45				$45	(Bethlehem, Massillon, Canton, Coatesville=$45)								
BILLETS, BLOOMS, SLABS							(Provo=$47.20, Duluth=$38[14])								
Carbon, rerolling	$36	$36	$36	$36	$36	$36	$36	$36				$48[14]	$38		
							(Provo=$53.20, Duluth=$44[14])								
Carbon, forging	$42	$42	42	$42	$42	$42	$42					$54[14]	$44		
Alloy	$54	$54				$54		(Bethlehem, Massillon, Canton=$54)					$58		
SHEET BARS	$36	$36		$36		$36	$36	$36	(Canton=$36)						
PIPE SKELP	1.90¢	1.90¢					1.90¢	1.90¢	(Coatesville=1.90¢)						
WIRE RODS[15]															
No. 5 to 9/32 in.	2.15¢	2.15¢		2.15¢	2.15¢	(Worcester=2.25¢)					2.40¢	2.65¢			
SHEETS															
Hot-rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold-rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.70¢	3.70¢	3.70¢		3.70¢	3.70¢	3.70¢	3.70¢	3.80¢	3.70¢		4.25¢		3.94¢	3.87¢
Enameling (20 gage)	3.45¢	3.45¢	3.45¢	3.45¢			3.45¢		3.55¢	3.45¢		4.10¢	3.55¢	3.81¢	3.77¢
Long ternes [2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot-rolled [3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold-rolled [4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester=3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity cold-rolled	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester=3.35¢)					3.05¢	3.31¢	
TINPLATE															
Standard cokes, base box	$5.00	$5.00	$5.00		$5.10				$5.10					$5.38	$5.32
Electro, box 0.25 lb	$4.35	$4.35	$4.35												
Electro, box 0.50 lb	$4.50	$4.50	$4.50						$4.60						
Electro, box 0.75 lb	$4.65		$4.65						$4.75						
BLACKPLATE															
29 gage [5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[11]			3.37¢
TERNES, MFG.															
Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25	(Duluth=2.35¢, Provo, Utah 2.95¢)			2.60¢	2.90¢	2.35¢	2.59¢	2.57¢
Rail steel [6]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢					2.60¢	2.90¢			
Reinforcing (billet) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold-finished [8]	2.75¢	2.75¢	2.75¢	2.75¢		2.75¢			(Detroit=2.80¢)		(Toledo=2.90¢)			3.09¢	3.07¢
Alloy, hot-rolled	2.70¢	2.70¢				2.70¢	2.70	(Bethlehem, Massillon, Canton=2.70¢)					2.80¢		
Alloy, cold-drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont=2.25¢, Provo, Utah 2.95¢)							
Carbon steel [12]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		2.25¢	2.25¢			2.60¢	2.80¢	2.47¢	2.44¢	2.30¢
Floor plates	3.50¢	3.50¢									3.85¢	4.15¢		3.86¢	3.82¢
Alloy	3.50¢	3.50¢			(Coatesville=3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem=2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	2.80¢			2.80¢			(Worcester=3.00¢)								
0.51 to 0.75 carbon	4.30¢			4.30¢			(Worcester=4.50¢)								
0.76 to 1.00 carbon	6.15¢			6.15¢			(Worcester=6.35¢)								
1.01 to 1.25 carbon	8.35¢			8.35¢			(Worcester=8.55¢)								
WIRE [9]															
Bright [12]	2.75¢	2.75¢		2.75¢	2.75¢		(Worcester=2.85¢)		(Duluth=2.80¢)			3.25¢			3.07¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire base														
Spring (high carbon)	3.35¢	3.35¢		3.35¢			(Worcester=3.45¢)					3.85¢			3.67¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt	21.25	20.40	15.725	16.15	19.125	23.375
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	21.25	20.40	15.725	16.15	19.125	23.375
Billets, P'gh, Chi, Canton, Newark, N. J., Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Newark, N. J., Ft. Wayne, Titusville	21.25	20.40	15.725	16.15	19.125	23.375
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	25.00	24.00	18.50	19.00	22.50	27.50
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	25.00	24.00	18.50	19.00	22.50	27.50
Plates, P'gh, Middletown, Canton	29.00	27.00	21.50	22.00	26.50	30.50
Shapes, structural, P'gh, Chi	25.00	24.00	18.50	19.00	22.50	27.50
Sheets, P'gh, Chi, Middletown, Canton, Balt	36.00	34.00	26.50	29.00	32.50	36.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	23.50	21.50	17.00	17.50	24.00	35.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	30.00	28.00	22.00	22.50	32.00	52.00
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila	25.00	24.00	18.50	19.00	22.50	27.50
Wire flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	30.00	28.00	22.00	22.50	32.00	52.00
Rod, h-r, Newark, N. J., Syracuse	25.00	24.00	18.50	19.00	22.50	27.50
Tubing, seamless, P'gh, Chi, Canton, (4 in. to 6 in.)	66.63	66.63	.....	63.30	.....	.....

SHELL STEEL

	per gross ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic openhearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

ELECTRICAL SHEETS

*Base, f.o.b. Pittsburgh; *f.o.b. Chicago, Gary*

	per lb
Field grade*	3.30¢
Armature*	3.65¢
Electrical*	4.15¢
Motor*	5.05¢
Dynamo	5.75¢
Transformer 72	6.25¢
Transformer 65	7.25¢
Transformer 58	7.75¢
Transformer 52	8.55¢

F.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb on all grades.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb
No. 1 O.H., gross ton $43.00
Angle splice bars, 100 lb..... 2.70

(F.o.b. basing points)	*per gross ton*
Light rails (from billets)	$45.00
Light rails (from rail steel)	44.00
	base per lb
Cut spikes	3.25¢
Screw spikes	5.40¢
Tie plate, steel	2.30¢
Tie plates, Pacific Coast	2.45¢
Track bolts	4.75¢
Track bolts, heat treated, to railroads	5.00¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk)

*(*Also Canton, O.)*	*base per lb*
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Pa.	18.00*	19.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	18.00	....
Inconel-clad 10 pct, f.o.b. Coatesville	25.00	....
Monel-clad 10 pct, f.o.b. Coatesville	24.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	base per keg	
Standard wire nails	$2.90	$3.40
Coated nails	2.90	3.40
Cut nails, carloads	3.85	....
	base per 100 lb	
Annealed fence wire	$3.20	$3.70
Annealed galv. fence wire	3.55	4.05
	base column	
Woven wire fence*	67	86
Fence posts, carloads	69	86
Single loop bale ties	66	91
Galvanized barbed wire**	72	92
Twisted barbless wire	72	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$6.00	$12.00
15-lb coating I.C.	7.00	14.00
20-lb coating I.C.	7.50	15.00

ALLOY EXTRAS

Alloy Steel	Basic Openhearth		Electric Furnace	
	Bars and Bar-strip	Billets, Blooms, and Slabs	Bars and Bar-strip	Billets, Blooms, and Slabs
NE 8600	0.65¢	$13.00	$1.15	$23.00
NE 8700	0.70	14.00	1.20	24.00
NE 9400	0.75	15.00	1.25	25.00
NE 9700	0.65	13.00	1.15	23.00
NE 9800	1.30	26.00	1.80	36.00
NE 9900	1.20	24.00	1.55	31.00

The extras shown are in addition to the base price of $2.70 per 100 lb on finished products and $54 per gross ton on semifinished steel, major basing points, as shown in table, opposite page, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. When acid openhearth is specified and acceptable, add to basic openhearth alloy differential 0.25¢ per lb for bars and bar-strip and $5 per gross ton for billets, blooms and slabs.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) base price—$200.00 per net ton

	Black	Galv.
Steel (buttweld)		
⅛-in.	63½	51
¼-in.	66½	55
1-in. to 3-in.	68½	57½
Wrought Iron (buttweld)		
⅛-in.	24	3½
¼-in.	30	10
1-in. and 1¼-in.	34	16
1½-in.	38	18½
2-in.	37½	18
Steel (lapweld)		
2-in.	61	49½
2½-in. and 3-in.	64	52½
3½-in. to 6-in.	66	54½
Wrought Iron (lapweld)		
2-in.	30½	12
2½-in. to 3½-in.	31½	14½
4-in.	33½	18
4½-in. to 8-in.	32½	17
Steel (butt, extra strong, plain ends)		
⅛-in.	61½	50½
¼-in.	65½	54½
1-in. to 3-in.	67	57
Wrought Iron (same as above)		
⅛-in.	25	6
¼-in.	31	12
1-in. to 2-in.	38	19½
Steel (lap, extra strong, plain ends)		
2-in.	59	48½
2½-in. and 3-in.	63	52½
3½-in. to 6-in.	66½	56
Wrought Iron (same as above)		
2-in.	33½	15½
2½-in. to 4-in.	39	22½
4½-in. to 6-in.	37½	21

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots.

	Seamless Cold-Drawn	Seamless Hot-Rolled	Lap-weld, Hot-Rolled
2 in. O.D. 13 B.W.G.	15.03	13.04	12.38
2½ in. O.D. 12 B.W.G.	20.21	17.54	16.58
3 in. O.D. 12 B.W.G.	22.48	19.50	18.35
3½ in. O.D. 11 B.W.G.	28.37	24.62	23.15
4 in. O.D. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft or 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger, f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect 3 pct tax on freight rates.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 pct additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	71 and 10
In packages	71
In bulk	80

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Percent Off List*
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Div. certifies in writing the consumers need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, cents per lb, ton lots.

Copper, electrolytic, 150 and 200 mesh	21½¢ to 23½¢
Copper, reduced, 150 and 200 mesh	20½¢ to 25½¢
Iron, commercial, 100 and 200 mesh 96 + % Fe	12½¢ to 15¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	4¢
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63¢
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 32¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢
Aluminum, 100 and 200 mesh	*25¢
Antimony, 100 mesh	30¢
Cadmium, 100 mesh	$1.40
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	11½ to 15¢
Manganese	65¢
Nickel, 150 mesh	51½¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb	$2.60
Under 100 lb	$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, Byproduct	
Chicago, del'd	13.75
Chicago, f.o.b.	13.00
New England, del'd	14.65
Kearny, N. J., f.o.b.	13.05
Philadelphia, del'd	13.28
Buffalo, del'd	13.40
Portsmouth, Ohio, f.o.b.	11.50
Painesville, Ohio, f.o.b.	13.15
Erie, del'd	13.15
Cleveland, del'd	13.30
Cincinnati, del'd	13.25
St. Louis, del'd	13.75†
Birmingham, del'd	10.90

*Hand drawn ovens using trucked coal permitted to charge $8.60 per ton plus transportation charges.

†Except producers situated in states other than Missouri, Alabama or Tennessee, sellers may charge a maximum delivered price of $14.25 in the St. Louis, Mo., and East St. Louis, Ill., switching districts.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$68.50
First quality, Pa., Md., Ky., Mo., Ill.	54.40
First quality, New Jersey	59.35
Sec. quality, Pa., Md., Ky., Mo., Ill.	49.35
Sec. quality, New Jersey	51.95
No. 1 Ohio	45.60
Ground fire clay, net ton	8.05
Silica Brick	
Pennsylvania and Birmingham	$54.40
Chicago District	62.45
Silica cement, net ton (Eastern)	9.55
Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. in bulk	22.00
in sacks	26.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

	Per Gross Ton
Old range, bessemer, 51.50	$4.95
Old range, non-bessemer, 51.50	4.80
Mesaba, bessemer, 51.50	4.70
Mesaba, non-bessemer 51.50	4.55
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	$3.518	$4.872[5]	$4.868[a]	$3.922	$4.772	$3.605	$3.666	$3.822	$4.172	$5.816	$6.866	$7.072	$8.172
New York	3.59	4.613	5.210	3.974[6]	4.772	3.768	3.758	3.853	4.203	5.858	6.908	7.103	8.203
Boston	3.744	4.744[9]	5.324[9]	4.106	4.715	3.912	3.912	4.044	4.244	6.012	7.062	7.194	8.394
Baltimore	3.394	4.852	4.994	3.902	4.752	3.594	3.759	3.802	4.152	....	....	....	....
Norfolk	3.771	4.965	5.471	4.165	4.865	3.971	4.002	4.065	4.265	....	....	....	....
Chicago	3.25	4.20	5.331	3.60	4.65[17]	3.55	3.55	3.50	3.85	5.60	6.65	6.65	7.75
Milwaukee	3.387	4.337	5.372	3.737	4.787[17]	3.687	3.687	3.637	3.987	5.837	6.887	6.887	8.137
Cleveland	3.35	4.40	4.977	3.60	4.45[17]	3.40	3.588	3.35	3.85	5.806	6.856	6.65	7.75
Buffalo	3.35	4.40	4.85	3.819	4.669	3.63	3.40	3.35	3.85	5.60	6.65	6.65	7.75
Detroit	3.45	4.50	5.10	3.70	4.659[17]	3.609	3.661	3.45	3.90	5.93	6.98	6.959	8.059
Cincinnati	3.425	4.475	4.925[5]	3.675	4.711	3.661	3.691	3.611	4.111	5.95	7.00	7.011	8.261
St. Louis	3.397	4.347	5.231	3.747	4.031[17]	3.697	3.697	3.647	4.131	5.981	7.031	7.031	8.131
Pittsburgh	3.35	4.40	4.85	3.60	4.45	3.40	3.40	3.35	3.85	5.60	6.65	6.65	7.75
St. Paul	3.50	4.46	5.357	3.86	5.102[17]	3.81[13]	3.81[13]	3.76[13]	3.461	5.94	5.99	7.361	8.461
Omaha	3.865	5.443	5.615	4.143	....	4.093	4.093	4.043	4.543	....	....	....	....
Indianapolis	3.52	4.568	5.018	3.768	4.741	3.63	3.63	3.58	4.08	5.93	6.98	6.98	8.23
Birmingham	3.45	....	4.85	3.70	....	3.55	3.55	3.50	4.53	....	....	....	....
Memphis	3.965	4.78	5.365	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	5.079	5.458	4.308	....	4.158	4.158*	4.108*	4.729	....	....	....	....
Houston	3.763	5.573	6.413[1]	4.313	....	4.25	4.25	3.75	6.473[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20	6.20	4.95	5.613[15]	4.95	4.65	4.40	5.683	8.204	9.404	9.304	10.454
San Francisco	4.55[14]	7.30[4]	6.45	4.50[14]	7.33[17]	4.65[14]	4.35[14]	4.15[14]	5.433	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	6.05	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.85	4.75[11]	....	4.85[11]	4.45[11]	4.45[11]	5.633	8.304	9.404	8.304	9.404
Salt Lake City	4.530[17]	....	6.27[13]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	6.00	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-FINISHED: Sheets, 400 to 1499 lb; strip, extras on all quantities; bars, 1500 lb base.

GALVANIZED: 450 to 1499 lb.

NE ALLOY BARS: 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb and over. (15) 1000 lb and over. (16) 1500 lb and over. (17) 2000 lb and over. (18) 3500 lb and over.

([a]) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271¢ for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Maximum per gross ton, established by OPA Oct. 22, 1945. Prices do not reflect 3 pct tax on freight.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	$26.25	$26.75	$27.25	$27.75	.....
Birdsboro	26.25	26.75	27.25	27.75	$31.25
Birmingham	20.75	22.13	.....	26.75	.....
Buffalo	24.75	25.75	26.25	26.75	31.25
Chicago	25.25	25.75	25.75	26.25	.....
Cleveland	25.25	25.75	25.75	26.25	.....
Detroit	25.25	25.75	25.75	26.25	.....
Duluth	25.75	26.25	26.25	26.75	.....
Erie	25.25	25.75	26.25	26.75	.....
Everett	26.25	26.75	27.25	27.75	.....
Granite City	25.25	25.75	25.75	26.25	.....
Hamilton	25.25	25.75	25.75	.....	.....
Neville Island	25.25	25.75	25.75	26.25	.....
Provo	23.25	23.75	.....	.....	.....
Sharpsville [1]	25.25	25.75	25.75	26.25	.....
Sparrows Point	26.25	26.75	.....	.....	.....
Steelton	26.25	.....	.....	.....	31.25
Swedeland	26.25	26.75	27.25	27.75	.....
Toledo	25.25	25.75	25.75	26.25	.....
Youngstown	25.25	25.75	25.75	26.25	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$ .50	$26.75	$27.25	$27.75	$28.25	.....
Boston	Birdsboro-Steelton	4.02	.....	.....	.....	.....	$35.27
Brooklyn	Bethlehem	2.50	28.75	29.25	29.75	30.25	.....
Brooklyn	Birdsboro	2.92	.....	.....	.....	.....	34.17
Canton	Cle, Yngstn, Sharpsvil.	1.39	26.64	27.14	27.14	27.64	.....
Canton	Buffalo	3.19	.....	.....	.....	.....	34.44
Cincinnati	Birmingham	4.06	24.81	26.19	.....	.....	.....
Cincinnati	Hamilton	1.11	.....	.....	26.86	.....	.....
Cincinnati	Buffalo	4.40	.....	.....	.....	.....	35.65
Jersey City	Bethlehem	1.53	27.78	28.28	28.78	29.28	.....
Jersey City	Birdsboro	1.94	.....	.....	.....	.....	33.19
Los Angeles	Provo	4.95	28.20	28.70	.....	.....	.....
Los Angeles	Buffalo	15.41	.....	.....	.....	.....	46.66
Mansfield	Cleveland & Toledo	1.94	27.19	27.69	27.69	28.19	.....
Mansfield	Buffalo	3.36	.....	.....	.....	.....	34.61
Philadelphia	Swedeland	.84	27.09	27.59	28.09	28.59	.....
Philadelphia	Birdsboro	1.24	.....	.....	.....	.....	32.49
San Francisco	Provo	4.95	28.20	28.70	.....	.....	.....
San Francisco	Buffalo	15.41	.....	.....	.....	.....	46.66
Seattle	Provo	4.95	28.20	28.70	.....	.....	.....
Seattle	Buffalo	15.41	.....	.....	.....	.....	46.66
St. Louis	Granite City	.50	25.75	26.25	26.25	26.75	.....
St. Louis	Buffalo	7.07	.....	.....	.....	.....	38.32

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50¢ a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10. Apr. 11, 1945, retroactive to Mar. 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50¢ a ton for each 0.25 pct silicon content in excess of basse grade which is 1.75 to 2.25 pct); Phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; Manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. Effective Mar. 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 pct silicon covered by RPS 10 as amended Feb. 14, 1946. Silvery iron, silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$31.25; f.o.b. Buffalo—$32.50. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Ferromanganese Briquets

Contract prices per pound of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66% contained Mn. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk	6.05¢	6.30¢	6.60¢
Ton lots	6.65¢	7.55¢	8.55¢
Less ton lots	6.80¢	7.80¢	8.80¢

Manganese Metal

Contract basis, lump size, per pound of metal, f.o.b. shipping point with freight allowed. Spot sales add 2¢ per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30¢
L.c.l. lots	32¢

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	34¢
Ton lots	36¢
Less ton lots	38¢

Spiegeleisen

Maximum base contract prices per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50
F.o.b. Pittsburgh, Chicago	40.00	

Low-Carbon Ferromanganese

Contract prices per pound of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, eastern zone. Add 0.25¢ for spot sales.

	Carloads, Ton	Less
0.06% C, 0.06% P, 90% Mn	33.00¢	33.40¢ 33.65¢
0.10% max. C, 1% or 2% max. Si	33.00¢	33.40¢ 33.65¢
0.15% max. C, 1% or 2% max. Si	32.00¢	32.40¢ 32.65¢
0.30% max. C, 1% or 2% max. Si	21.00¢	21.40¢ 21.65¢
0.50% max. C, 1% or 2% max. Si	20.00¢	20.40¢ 20.65¢
0.75% max. C, 7.00% max. Si	16.00¢	16.40¢ 16.65¢

Electric Ferrosilicon

OPA maximum base price cents per pound contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern	Central	Western
50% Si	6.65¢	7.10¢	7.25¢
75% Si	8.05¢	8.20¢	8.75¢
80-90% Si	8.90¢	9.05¢	9.55¢
90-95% Si	11.05¢	11.20¢	11.65¢

Silvery Iron

Si 14.01 to 14.50%, $47.25 per G. T. f.o.b. Jackson, Ohio; $48.75 f.o.b. Keokuk, Iowa; $46.75 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

OPA maximum base price per pound of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb, packed. Add 0.25¢ for spot sales.

	Eastern	Central	Western
96% Si, 2% Fe	13.10¢	13.55¢	16.50¢
97% Si, 1% Fe	13.45¢	13.90¢	16.80¢

Ferrosilicon Briquets

OPA maximum base price per pound of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add 25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk	3.35¢	3.50¢	3.65¢
2000 lb-carload	3.80¢	4.20¢	4.25¢

Silicomanganese

Contract basis lump size, per pound of metal, f.o.b. shipping point with freight allowed. Add 25¢ for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05¢
2000 lb to carload	6.70¢
Briquet, contract basis, carlots, bulk freight allowed, per lb	5.80¢
2000 lb to carload	6.30¢
Less ton lots	6.55¢

Ferrochrome

(65-72% *Cr*, 2% *max. Si*)

OPA maximum base contract prices per pound of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add 0.25¢ per lb contained Cr for spot sales.

	Eastern	Central	Western
0.06% C	23.00¢	23.40¢	24.00¢
0.10% C	22.50¢	22.90¢	23.50¢
0.15% C	22.00¢	22.40¢	23.00¢
0.20% C	21.50¢	21.90¢	22.50¢
0.50% C	21.00¢	21.40¢	22.00¢
1.00% C	20.50¢	20.90¢	21.50¢
2.00% C	19.50¢	19.90¢	21.00¢
66-71% Cr, 4-10% C	13.00¢	13.40¢	14.00¢
62-66% Cr, 5-7% C	13.50¢	13.90¢	14.50¢

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low-carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5¢ per lb to regular high-carbon ferrochrome price schedule.

Ferrochrome Briquets

Contract prices per pound of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60% contained chromium. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk	8.25¢	8.55¢	8.95¢
Ton lots	8.75¢	9.25¢	10.75¢
Less ton lots	9.00¢	9.50¢	11.00¢

Calcium—Manganese—Silicon

Contract prices per pound of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carloads	15.50¢	16.00¢	18.05¢
Ton lots	16.50¢	17.35¢	19.10¢
Less ton lots	17.00¢	17.35¢	19.60¢

Calcium Metal

Eastern zone contract prices per pound of metal, f.o.b. shipping point, freight allowed to destination. Add 5¢ for spot sales. Add 0.9¢ for central zone; 0.49¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.80	$2.30	$5.00
Less ton lots	2.30	2.80	5.75

Chromium—Copper

Contract price per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2¢ for spot sales.

Shot or ingot	45¢

Ferroboron

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed to destination. Add 5¢ for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% Max. C.

	Eastern	Central	Western
Ton lots	$1.20	$1.2075	$1.229
Less ton lots	1.30	1.3075	1.329

Manganese—Boron

Contract prices per pound of alloy, f.o.b. shipping point, freight charges allowed. Add 5¢ for spot sales.

75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern	Central	Western
Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per pound of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern	Central	Western
11,200 lb or more	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, standard grade lump or ¼X down, packed f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per pound contained tungsten, 10,000 lb or more	$1.90
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, usual freight allowances, per pound contained V.	
Openhearth	$3.70
Crucible	$3.80
Primos	$3.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producers plant, usual freight allowances, per pound of cobalt metal	$1.50
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, any quantity, per pound conatined V_2O_5. Spot sales add 5¢ per lb contained V_2O_5	$1.10
Silcaz No. 3, contract basis, f.o.b. plant with usual freight allowances, per pound of alloy.	
carload lots	25¢
2000 lb to carload	26¢
Silvaz No. 3, contract basis, f.o.b. plant with freight allowances, per pound of alloy.	
Carload lots	58¢
2000 lb to carload	59¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb and over, max. based on rate to St. Louis	
No. 1	87.5¢
No. 6	60¢
No. 79	45¢
Bortram, f.o.b. Niagara Falls	
Ton lots, per lb	45¢
Less ton lots, per lb	50¢
Ferrocolumbium, 50-60%, contract basis, f.o.b., plant with freight allowances, per pound contained Cb.	
2000-lb lots	$2.25
Under 2000-lb lots	$2.30
Ferrotitanium, 40-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.33
Less ton lots	$1.35
Ferrotitanium, 20-25%, 0.10%C. max., ton lots, per pound contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15-20%, 6-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y. freight allowed east of Mississippi, north of Baltimore and St. Louis, per carload	$142.50
Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per pound contained Mo.	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo g.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per pound of alloy. Add ¼¢ for spot sales	
Carload lots	14¢
Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per pound of alloy	
Carload, bulk	4.60¢
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk	5.75¢
Ton lots	7.25¢
Simanal (approx. 30% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per pound.	
Car lots	8.00¢
Ton lots	8.75¢
Less ton lots	9.25¢

Contracts Signed With 500 Firms in Machine Tool Disposal Program

(CONTINUED FROM PAGE 111)

The MacKenzie Machinery Co., 36 Oliver St., Boston.
Hazard Brownell, 350 Waterman St., Providence.
Austin-Hastings Co., Inc., 226 Binney St., Cambridge, Mass.
Stedfast & Roulston, Inc., 156 Oliver St., Boston.
United Machinery & Tool Corp., 35 Herman St., Worcester.
Alfred L. Brown Associates, Inc., 4 Cherry St., Worcester.
Triplex Machine Co., 117 Fourth St., Pittsfield, Mass.
H. Leach Machinery Co., 387 Charles St., Providence.
Botwinik Brothers of Mass., Inc., 2 Sherman St., Worcester.
Machineshop Equipment Co., 170 Summer St., Boston.
The Harold Co., 137 Oliver St., Boston.
The E. M. Noel Co., 71 Newbury St., Boston.
The Nutmeg State Machinery Corp., 1041 State St., New Haven, Conn.
Daley & Sibley, 417 Chapel St., New Haven, Conn.
Wigglesworth Machinery Co., 199 Bent St., Cambridge, Mass.

CHARLOTTE, N. C.

The Textile Mill Supply Co., 1300 S Mint St., Charlotte, N. C.

CHICAGO

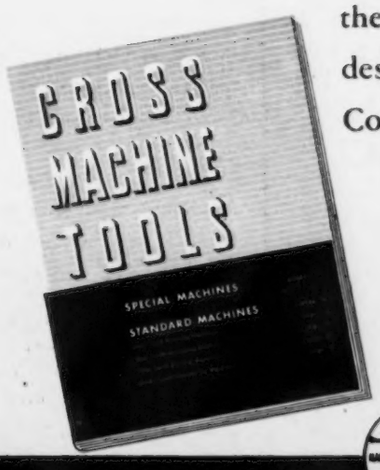
George M. Bernstein & Co., 12-18 S Clinton St., Chicago.
Bryant Machinery & Engineering Co., 400 W Madison St., Chicago.
Mandel & Smithson Machinery Co., 712 Washington Blvd., Chicago.
C. B. Burns Machinery Co., 541 W Washington Blvd., Chicago.
Earle Hart Woodworking Machine Co., 565 W Washington Blvd., Chicago.
Miller Equipment Buyer, 409 Jefferson St., Ft. Wayne, Ind.
Bengtson, Inc., 208 S. LaSalle St., Chicago.
Engineering Sales, Madison Rd., R.R. No. 2, Anderson, Ind.
Hill-Clarke Machinery Co., 649 W Washington Blvd., Chicago.
William A. Stone, 218 N Canal St., Chicago.
Neff, Kohlbusch & Bissell, 2400 W. Madison St., Chicago.
Indianapolis Machinery & Supply Co., Inc., 1959 S Meridian St., Indianapolis.
Richmond Machinery Equipment Co., 106 N Desplaines St., Chicago.
E. Cohn & Sons, Inc., Cedar Rapids, Iowa.
Robert W. Rice & Co., 110 N. DesPlaines St., Chicago.
P. P. Wagener, 1714 Walnut Ave., Wilmette, Ill.
W. L. Steege Machinery Co., 25 S Jefferson St., Chicago.
Luther & Pedersen, Inc., 565 W. Washington Blvd., Chicago.
Adams Machinery Co., 114 S Clinton St., Chicago.
The Purdy Co., 122 S Michigan Ave., Chicago.
Prescott Production Tool Co., 1200 N Ashland Ave., Chicago.
Barron Machinery Co., 32 N Clinton St., Chicago.
H. W. Industries, 5665 W. Lake St., Chicago.
Hosdreg Industries, Inc., Huntington, Ind.
M. Taub, dba, Universal Machinery Co., 613 W Washington Blvd., Chicago.
Machinery & Electric Motors Co., 817 W Lake St., Chicago.
Hood Machinery Co., Yorktown, Ind.
Winston Machinery Corp., Inc., 1102 Burdsal Pky, Indianapolis.
Joseph Behr & Sons, Inc., 1126 Seminary St., Rockford, Ill.
Matson Machinery Sales, 610 W Michigan St., Milwaukee.
Scully Machinery & Equipment Corp., 77 W Washington St., Chicago.
Franklin Supply Co., 600 S Michigan Ave., Chicago.
Root Bros. Mfg. & Supply Co., 10307 S Michigan Ave., Chicago.

(CONTINUED ON PAGE 128)

Profitable Production

- TURNING
- MILLING
- DRILLING
- BORING
- REAMING
- TAPPING
- GRINDING

BY NOW, the machine tool under the canvas cover is producing extra profit for its user. Its size and shape are only of passing interest since they conform to his job alone. Its performance, however, is important to all engaged in the production of metal parts, because it represents the latest thought in combined metal-removing operations — Cross Special Process Machines that automatically move the work through a complete cycle of different operations to produce a finished product... tools that are built around a particular set of machining requirements for doing the work accurately, in the least time, with the least labor and for the most profit. Send for the new book describing some of these machines. The Cross Company, Detroit, Michigan, Dept. 202.



S-28

SPECIAL MACHINES

for automatically performing any one or a combination of metal cutting operations
TURNING · MILLING · DRILLING · BORING · REAMING · TAPPING · GRINDING

(CONTINUED FROM PAGE 125)

Consumers Machinery Exchange, Inc., 146 W Root St., Chicago.
The E. L. Essley Machinery Co., 825 W Evergreen Ave., Chicago.
Nichol Machinery Co., Inc., 637 N Seventh St., Milwaukee.
Marshall & Huschart Machinery Co. of Ind., 628 Chamber of Commerce Bldg., Indianapolis.
Harris Supply Co., 809 Madison St., Chicago.
Cook County Machinery Co., 1034 West Lake St., Chicago.
Malco Machinery Co., 745 W Van Buren St., Chicago.
H. J. Weber & Co., 549 W Washington Blvd., Chicago.
State Machinery Co., Inc., 31 E Georgia St., Indianapolis.
F. Mayer, 608 S Dearborn St., Chicago.
Ira C. Jordan, 2508 E. Belleview Place, Milwaukee.
H. H. Pelz Machinery Co., 627 W Washington Blvd., Chicago.
M. J. Schmitt Machine Tools, 7006 W Greenfield Ave., West Allis, Wis.
L. L. Richards Machinery Co., 529 S Second St., Milwaukee.
Marshall & Huschart Machinery Co., 571 W Washington Blvd., Chicago.
Ashland Machinery Co., 565 W Washington Blvd., Chicago.
Davis Machinery Co., 126 N Clinton St., Chicago.
Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.
David C. Pyke, 221 Transportation Bldg., Indianapolis.
H. F. Wolnick Machinery Co., 9 S Clinton St., Chicago.
Gisholt Machine Co., 1245 E Washington Ave., Madison, Wis.
Walter F. Stegner Co., 20 N Wacker Drive, Chicago.
John H. Sipchen Co., 549 W Washington Blvd., Chicago.
Clinton Supply Co., 110 S Clinton St., Chicago.
Pagel Machinery Co., 1641 S 24th St., Milwaukee.
Interstate Machinery Co., Inc., 1431 W Pershing Road, Chicago.
Fry Machinery Sales Co., 14 N Clinton St., Chicago.
A-C Supply Co., 249 N Water St., Milwaukee.
Walter H. Meyer Machinery Co., 250 Farmers Trust Bldg., Ft. Wayne, Ind.
Moser Machinery Co., 1530 W National Ave., Milwaukee.
The Homer B. Johnson Co., 549 W Washington, Chicago.
Clinton Machinery Co., 32 S Clinton St., Chicago.
Donahue Steel Products Co., 1919 W. 74th St., Chicago.
Federal Machinery Sales Corp., 9 S Clinton St., Chicago.
Victor Machinery Co., 130 S Clinton St., Chicago.
Kirby Risk Electric Co., 302 Ferry St., Lafayette, Ind.

DALLAS

Briggs-Weaver Machinery Co., 309 N Market St., Dallas.
Long Machine, Tool & Die Co., 2801 Elm St., Dallas.
Bert Tolbert Machinery Co., 505 W Weatherford St., Fort Worth, Tex.
Hamilton Huster Machinery Co., 1109 Patterson Ave., Dallas.
Margett Electric Co., Inc., 1811 N Harwood St., Dallas.
Perry Machinery Co., 409 S Akard St., Dallas.
Mims Equipment Service, 3404 Ross Ave., Dallas.
C. R. Brown, Jr., 1914 Moser St., Dallas.
Bill Lindsley Machinery Co., 3001 Elm St., Dallas.
C. J. Harter Machinery, 1401 Gulf States Bldg., Dallas.
P. D. Browne Co., Irwin-Keasler Bldg., Dallas.
Overton & Ross Co., 2703 Main St., Dallas.

DENVER

Veterans Projects Corp., 313 First National Bank Bldg., Denver.
Kenyon Iron Works, 1400 Delgany St., Denver.
The Mine & Smelter Supply Co., 17th & Blake Sts., Denver.
F. J. Leonard Co., 514 18th St., Denver.

LET HIM HELP YOU

Choose the *Right* Electrode for Welding Mild Steels

The P&H representative knows arc welding. He's a specialist who lives with welding problems . . . who knows how to help you save time, save money and insure the best welding results through the proper selection of electrodes for every type of job.

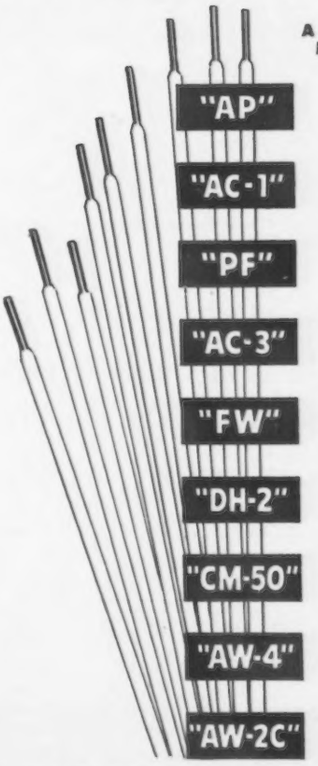
Today, a staggering amount of time and money is wasted through misapplications. Don't let it happen in your shop. Whatever your mild steel welding work may be, you'll find the correct sizes and types of electrodes in the P&H line to answer every need. The quick and easy way to be sure, on this or any other welding problem, is to call in your nearest P&H representative. He brings you the experience of one of the world's largest *makers* and *users* of all types of welding electrodes. He is ready to help you without cost or obligation. Ask him to call.

P&H
HARNISCHFEGER CORPORATION

WELDING ELECTRODES

4401 W. National Avenue
Milwaukee 14, Wisconsin

WELDING ELECTRODES • MOTORS • HOISTS • ELECTRIC CRANES • ARC WELDERS • EXCAVATORS



A Few P&H Electrodes For Mild Steel Applications

"AP" — AWS — E-6010 (DC Reverse Polarity)

"AC-1" — AWS — E-6011 AC and DC (Straight or Reverse Polarity)

"PF" — AWS — E-6012 AC and DC (Straight Polarity)

"AC-3" — AWS — E-6013 AC and DC (Straight or Reverse Polarity)

"FW" — AWS — E-6020 AC and DC (Straight or Reverse Polarity)

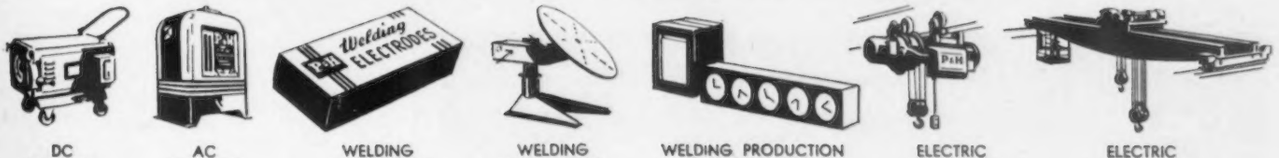
"DH-2" — AWS — E-6020 AC and DC (Straight or Reverse Polarity)

"CM-50" — AWS — E-7011 AC and DC (Straight or Reverse Polarity)

"AW-4" — AWS — E-10012 AC and DC (Straight or Reverse Polarity)

"AW-2C" — AWS — E-10020 AC and DC (Straight or Reverse Polarity)

A COMPLETE ARC WELDING SERVICE • WRITE FOR BULLETIN R7-3



DC WELDERS | AC WELDERS | WELDING ELECTRODES | WELDING POSITIONERS | WELDING PRODUCTION CONTROL SYSTEMS | ELECTRIC HOISTS | ELECTRIC CRANES

Hendrie & Bolthoff Mfg. & Supply Co., 1635 17th St., Denver.

DETROIT

John D. Howarth & Co., 3135 E Jefferson Ave., Detroit.
William F. Scott Machinery Co., 12416 Flanders, Detroit.
Addy & Luby Machinery Co., 8316 Woodward Ave., Detroit.
Walter F. Rooney, 1322 Horton Road, Jackson, Mich.
Prussian Machinery Co., 1475 E Grand Blvd., Detroit.
Holzbaugh Machinery Sales, 10905 Charlevoix, Detroit.
E. A. Krueger Co., 1010 Kirk St., Saginaw, Mich.

LOS ANGELES

Given Machinery Co., 3855 Santa Fe Ave., Los Angeles.
C. S. Morris Machinery Co., 1932 Santa Fe Ave., Los Angeles.
Machinery Sales Co., 3838 S Santa Fe Ave., Los Angeles.
Harry King, 2328 Santa Fe Ave., Los Angeles.
SM Equipment Co., 5531 S Vermont Ave., Los Angeles.
Moore Machinery Co., 3876 Santa Fe Ave., Los Angeles.
Harron, Rickard & McCone Co. of Southern Calif., 3850 Santa Fe Ave., Los Angeles.

NEW YORK

J. F. Owens Machinery Co., 1804 Erie Blvd., E Syracuse, N. Y.
Morris Machinery Co., Inc., 99-115 Chestnut St., Newark, N. J.
Buffalo Machinery Co., Inc., 833 Grant St., Buffalo.
Morey Machinery Co., Inc., 410 Broome St., New York.
F. W. Schiefer Machinery Co., 514 E. & B. Bldg., 39 State St., Rochester, N. Y.
Don W. Patterson Co., 2012 Rand Bldg., Buffalo.
Ganey Machinery Co., 1807 Elmwood Ave., Buffalo.
John S. Johnston, 141 Broadway, Rm. 1113, New York.
J. L. Lucas & Son, Inc., Fairfield, Conn.
Giebel, Inc., 250 W 57th St. and 152 Temple St., New Haven, Conn.
Everready Electric & Supply Co., 505 Housatonia Ave., Bridgeport, Conn.
Grace & Way, Slingerlands, New York.
O'Dowd & McNichol, 277 Broadway, New York.
Hull-Engineering Co., 90 Grove St., New York.
R. L. Crane Machinery Co., 296 Delaware Ave., Buffalo.
Alex Zeeve & Co., 2271 Woolworth Bldg., New York.
Wm. Halpern & Co., 53 Park Place, New York.
M. A. Newman, 1662 Chapel St., New Haven, Conn.
Noble Machinery Co., Inc., 217 Centre St., New York.
J. L. Osgood Machinery & Tool Co., 43 Pearl St., Buffalo.
Robert E. Joy & Co., 165 Broadway, New York.
Dewelsaw Machinery & Tool Corp., 423 Ninth Ave., New York.
M. P. Goodley Machinery & Tools, P. O. Box 324, 811 Audobon Parkway, Syracuse, N. Y.
Double Industrial Service Co., 80 Park Place, Newark, N. J.
D. E. Dony Machinery Co., 47 Laurelton Road, Rochester, N. Y.
Spiro Machine Tool Co., 239 Centre St., New York.
Howard G. Wipperman, 551 Parkside Ave., Buffalo.
Robert H. Steidlitz, 439 E Water St., New York.
Wiener Machinery Co., Inc., 237 Centre St., New York.
The H. A. Smith Machinery Co., 609 Syracuse-Kemper Bldg., Syracuse, N. Y.
Hasco Machinery Co., 661 Frelinghuysen Ave., Newark, N. J.
L. Weisman Co., 565 Fifth Ave., New York.
George Keller Machinery Co., 1807 Elmwood Ave., Buffalo.
Pauling, Inc., 62 William St., New York.
Triboro Wood Working Mach., 147 Grand St., New York.
Titusville Sales Co., Inc., 50 W 50th St., New York.

G. W. Bunton & Son, 2882 Delaware Ave., Kenmore, N. Y.
Arbus Machine Tool, 55 W 42nd St., New York.
Du Bose & Co., Inc., 141 Broadway, New York.
First Machinery, E 9th St., & E. River, New York.
Kings County Mach., 394 Atlantic Ave., Brooklyn.
A. A. Johnson, 615 Eire Blvd., Syracuse, N. Y.
National Mach. Co., 429 William St., East Orange, N. J.
E. Miltenberg, Inc., 43 Great Jones St., New York, N. Y.

OMAHA

Fuchs Machinery & Supply Co., 521 S 15th St., Omaha, Neb.
Interstate Machinery & Supply Co., 1006 Douglas St., Omaha, Neb.
Sidles Co., 502 S 19th St., Omaha, Neb.

PHILADELPHIA

Machine Tools Sales Co., 1601 Chestnut St., Philadelphia.
L. F. Seyfert's Sons, Inc., 523 Arch St., Philadelphia.
Samuel Machinery Co., 137 N Third St., Philadelphia.
Monarch Machinery Co., 327 N Third St., Philadelphia.
Bauer Machinery Co., 1114 Frankford Ave., Philadelphia.
Ace Electric Co., 145 N Third St., Philadelphia.
Quaker City Machinery Co., Market St. National Bank Bldg., Philadelphia.
Alfred S. Knesby, Delaware & Montrose Aves., Upper Darby, Pa.

RICHMOND, VA.

Harry L. Grant Service., 1029 Vermont Ave., NW, Washington, D. C.
M. W. Rowell, 434 Southern Bldg., Washington, D. C.

ST. LOUIS

Robert R. Stephens Machinery Co., 3615 Olive St., St. Louis.
Blackman & Nuetzel Machinery Co., 3713 Washington Ave., St. Louis.
Colcord-Wright Machinery & Supply Co., 1229 N Broadway, St. Louis.
McDonald Machinery Co., 1531 N Broadway, St. Louis.

SALT LAKE CITY

J. M. Grisley, 114 W Third South, Salt Lake City.
Equipment Supply Co., 60 Richards St., Salt Lake City.
The Lang Co.,—Machinery Div., 267 W First S St., Salt Lake City.

G-P Sells Subsidiary

Detroit

• • • **Graham-Paige** Motors Co. has sold all the outstanding and authorized stock of its subsidiary, the Warren City Mfg. Co., Warren, Ohio, to Federal Machine & Welding Co. of Warren.

The sale, according to Joseph W. Frazer, chairman of Graham-Paige, was made at a price equal to the aggregate book value of the stock as it will be as of Jan. 25, 1946. He said the reason for the sale was the desire of Graham-Paige to house all its operations under one roof at Willow Run, where the heavy machinery of the subsidiary was not adaptable for either automobile or farm equipment production.

Construction Steel . . .

New York

• • • **Fabricated steel awards** this week included the following:

2050 Tons, Battle Creek, Mich., Michigan Carton Co. board mill buildings, to Duffin Iron Co, Chicago

1300 Tons, Philadelphia, warehouse for Sears, Roebuck & Co., to Bethlehem Steel Co., Bethlehem, Pa.

700 Tons, Oakville, Iowa, state highway bridge, to Bethlehem Steel Co., through A. Olsen Construction Co., Waterloo, Iowa, general contractor.

550 Tons, Minneapolis, Sears Roebuck & Co. mail order warehouse, to Bethlehem Steel Co.

525 Tons, Dubuque, Iowa, fertilizer plant building, Virginia Carolina Chemical Corp., to Rock Island Bridge & Iron Works, Rock Island, Ill.

525 Tons, Winston-Salem, N. C., Duplan Corp., nylon mill, to Virginia Bridge Co., Roanoke, Va.

297 Tons, Auburn, Calif., bridge across East St. and overhead crossing over Southern Pacific tracks, California Div. of Highways, through H. W. Ruby, to Moore Dry Dock Co.

275 Tons, Lyndhurst, N. J., Italian Cook Oil Co., building, to Bethlehem Steel Co.

250 Tons, Chicago, Illinois Institute of Technology metallurgy building, to American Bridge Co., Chicago.

228 Tons, Humboldt Co., Calif., Mad River bridge California Div. of Highways, through Mercer Fraser Co., to Moore Dry Dock Co.

225 Tons, Lynn, Mass., General Electric Co. mill building, to Ingalls Iron Works Co.

225 Tons Ludlow, Mass., Ludlow Mfg. Co. power house to Haarman Steel Co., Holyoke, Mass.

210 Tons Kearny, N. J., Western Electric Co., remodeling building, to American Bridge Co., Pittsburgh, through United Engineers & Constructors.

200 Tons, Clifton, Mo., Wabash RR. beam span No. 429, to Bethlehem Steel Co.

145 Tons, New Brunswick, N. J., Wm. A. Cleary Corp., factory building, to Bethlehem Steel Co., Bethlehem, Pa.

138 Tons, San Jose, Calif., Ford Ave. undercrossing, Coyote Road bridges, California Div. of Highways to Bethlehem Pacific Coast Corp.

100 Tons Carneys Point, N. J., building, to Morris Wheeler Co.

100 Tons, Cicero, Ill., Schneider Metal Mfg. Co. buildings, to Duffin Iron Co., of Chicago.

100 Tons, Bellevue, Ohio, Spencer Kellogg & Sons, track shed, to Duffin Iron Co., Chicago.

• • • **Fabricated steel inquiries** this week were as follows:

2300 Tons, Canyon Diablo, Ariz., Santa Fe railroad bridge A-313.

2049 Tons, Los Angeles, overhead crossing on Terminal Island Freeway over U.P., S.P., and P.E. tracks at Anaheim St., California Div. of Highways, Los Angeles, bids due Feb. 14.

1050 Tons, Peoria, Ill., newspaper publishing plant.

846 Tons, Redding, Calif., gates for Keswick Dam, U.S. Bureau of Reclamation.

600 Tons, Toledo, Libbey-Owens-Ford Glass Co. unit, Stone & Webster Engineering Corp., Boston contractor.

500 Tons, Chicago, United Airlines service hangar.

250 Tons, Providence, Brown University, girls' dormitory, Gilbane Building Co., Inc., Providence, contractor.

235 Tons, Miami, Fla., Louis Kasoff, warehouse.

200 Tons, Willimantic, Conn., State Teachers College unit.

200 Tons, Providence, People's Savings Bank building.

170 Tons, Philadelphia, Charles Leing & Co., Inc., boiler installation, Stone & Webster Engineering Corp., Boston, contractor.

150 Tons, Concord, N. H., Rumford Press plant.

100 Tons, Flagstaff, Ariz., Flagstaff-Winslow highway, Arizona State Highway Commission, Phoenix, bids due Jan. 30.

• • • **Reinforcing bar awards** this week included the following:

1500 Tons, San Diego, four Navy piers, 11th Naval District, through M. H. Golden, to Bethlehem Pacific Coast Corp. (in addition to 1700 tons reported in issue of 1/17/46).

700 Tons, Evanston, Ill., Northwestern University dormitory, to Joseph T. Ryerson & Son, Inc., Chicago, through R. C. Wiebeldt Co., Chicago, general contractor.

600 Tons, Hammond, Ind., Standard Oil Co. of Indiana research laboratory, to Joseph T. Ryerson & Son, Inc., Chicago, through Gust K. Newberg Construction Co., Chicago, general contractor.

467 Tons, Santa Ana, Calif., parkway, California Div. of Highways through Byerts & Dunn, to Blue Diamond Corp.

315 Tons, Santa Ana, Calif., parkway, California Div. of Highways through Peter Kiewit Sons' Co., to Ceco Steel Products Co.

310 Tons, Marcus Hook, Pa., Sinclair refinery, reported to Carnegie-Illinois Steel Corp.

300 Tons, St. Bernard, Ohio, Procter & Gamble, project, to Jos. T. Ryerson & Sons, Chicago.

290 Tons, Superior, Wis., bins for Great Northern RR., to Carnegie-Illinois Steel Corp., through James Stewart & Co., Inc., general contractor, Chicago.

200 Tons, San Jose, Calif., Ford Ave. undercrossing Coyote Road bridge, California Div. of Highways, to San Jose Steel Co.

180 Tons, Humboldt Co., Calif., Mad River bridge, California Div. of Highways, through Mercer, Fraser Co., to Gilmore Fabricators, Inc.

170 Tons, St. Paul, Minn., St. Thomas College science building, to Paper, Calmenson & Co., St. Paul, through McGough Brothers, St. Paul, general contractor.

170 Tons, Crookston, Minn., power plant, to Paper, Calmenson & Co., St. Paul, through Fuel Economy Engineering Co., general contractor.

170 Tons, Dixon, Calif., Ulatic Creek bridge at Midway-Solano, California Div. of Highways, through Frederickson Bros., to Judson-Pacific-Murphy Corp.

156 Tons, Auburn, Calif., bridge across East St. and overhead crossing over Southern Pacific tracks, through H. W. Ruby, to Gilmore Fabricators, Inc.

150 Tons, Boston, Massachusetts General Hospital children's ward, to Concrete Steel Co., Boston.

150 Tons, Buffalo, N. Y., Sattler's Department Store addition, through Siegfried Construction Co., Buffalo, to Bethlehem Steel Co., Bethlehem, Pa.

135 Tons, Los Angeles, Hollywood Parkway (Benton Way), California Div. of Highways, through Byerts & Dunn, to Blue Diamond Corp.

130 Tons, Aurora, Ill., Copley Hospital, to Concrete Steel Co., Chicago through Sumner S. Sollitt & Co. Chicago, general contractor.

100 Tons, Peoria, Ill., Illinois Bell Telephone Co. building, to Bethlehem Steel Co., through V. Johst & Sons, Peoria, general contractor.

100 Tons, Dixon, Calif., Ulatic Creek bridge at Midway-Solano, California Div. of

Highways, through Fredericksom Bros., to Bethlehem Pacific Coast Corp.

• • • **Reinforcing bar inquiries** this week included the following:

1200 Tons, Sharon Hill, Pa., Curtis Publishing Co., Stone & Webster Engineering Corp., Boston.

811 Tons, Los Angeles, overhead crossing on Terminal Island Freeway over U.P., S.P., and P.E. tracks at Anaheim St., California Div. of Highways, Los Angeles, bids due Feb. 14.

395 Tons, Newport, Ky., flood control project.

300 Tons, Concord N. H., Rumford Press plant.

300 Tons, Baltimore, group of tanks for Lever Bros. Co., Cambridge, Mass., to Bethlehem Fabricators, Bethlehem, Pa., and Hammon Boiler Works Co., Warren, Pa., through Stone & Webster Engineering Corp., Boston.

250 Tons, Watertown, Mass., New England Foundation Co., Inc., caisson shells, to International Engineering Works, Framingham, Mass.

200 Tons, Alma, Wis., Dairyland Co-operative Association power house.

180 Tons, Linn County, Iowa, highway paving project.

175 Tons, Monticello, Minn., Land O'Lakes Creameries, Inc.

150 Tons, Los Angeles, two overhead crossings on Santa Ana Parkway over Ramona Parkway Ramp 4, California Div. of Highways, Los Angeles, Feb. 14.

150 Tons, Pine City, Minn., Land O'Lakes Creameries, Inc.

150 Tons, Milwaukee, Milwaukee Railroad fabricating shop.

150 Tons, Beach Grove, Ind., Early & Daniel Feed Mill.

140 Tons, Boulder City, Nev., Bureau of Reclamation.

140 Tons, Omaha, Neb., Children's Memorial Hospital.

127 Tons, San Diego, overcrossing on Route 77 at Richmond St. California Div. of Highways, Los Angeles, Feb. 14.

Bethlehem Steel Sells Pittsburgh Properties

Pittsburgh

• • • **Bethlehem Steel Co.,** last week sold its structural fabricating plant at Carnegie, Pa. Purchase of the property, which includes some 17 acres of ground and six buildings with a power plant, was made by C. R. Anthony, chairman of the board of International Staple Co., and vice-president of both Climax Fire Brick Co., and Climax Engineering Co. The use to which the property will be finally put, however, has not been indicated.

Bethlehem also indicated that it has sold its non-plant property at Leetsdale, Pa., comprising about 90 acres. The Boro of Edgeworth obtained 30 acres of this property and A. W. Murphy, a realtor, purchased the remaining acreage. Despite reports to the contrary, Bethlehem indicated that there would be no curtailment or elimination of fabricating activities of the Leetsdale plant, which is primarily a plate and structural fabricating plant.

Common Sense in Job Evaluation

(CONTINUED FROM PAGE 49)

ent paying 65¢ to 75¢ per hr should be plotted against their rates and assigned points. The mean should then be computed for all of these jobs. This procedure should be repeated for all labor grades and their rate ranges. Where the rate ranges overlap, this will of course mean that those jobs which fall within the overlapping sections will be included in the computation of the mean line for both labor groups in which the jobs fall.

The chart will then be covered by a series of straight lines, each line representing the average relationship between the assigned point values and the actual average rates for that group. If these straight lines are connected and made into a smooth line along the direction of greatest contact, the result will be a curve which will show the actual weighted, mean relationship between points assigned and wage rates being paid in every bracket.

Once this line is established, the management may then accept this line as representing the standard conversion to be made on all jobs if the curve is logical and acceptable as a measure of value. Since the curve, however, merely shows the present wage structure in relation to actual point value, this curve is entirely empirical and may be adjusted by management as required in order to establish a curve of standard conversion.

The curve of standard conversion which will finally be used by the management will, of course, reflect management's own desires in the construction of a wage structure in its organization. This standardized curve may be based on the weighted mean already obtained or it may be based on any variation of this weighted mean.

There are any number of methods which can be used to create curves or straight lines for any desired pattern of wage increments in relation to rising point values. One method, resulting in a straight line, is to establish a certain level of point value as being equivalent to the company minimum rate and assigning a fixed value to each point above that minimum. This method will produce a straight line, the slope of the line being determined by the value placed on each point. The higher the value assigned per point, the greater the slope will be. Where it is desired to base point conversions on a curve which rises at a gradually accelerating rate as the assigned point values increase, this may be accomplished by several simple mathematical formulas. One simple method is to fix the value of a point at the factory minimum and then gradually increase the value per point for successive labor grades. For example: if 60 points are established as equivalent to the company minimum pay of 60¢ per hr, the value of all points from 61 to 80 may be $.01 per point; from 81 to 100, $0.125 per point; from 101 to 120 points, .0150 per point, etc. This method will produce a curve which gives a decided advantage in the upper point brackets at which labor scarcities usually prevail. Again, the actual values and therefore the rate at which the curve ascends, can be determined by the desired wage policy of the company.

A. B. Otis MacArthur Aide

Washington

• • • **Arthur B. Otis** of the CPA Steel Branch, will become the iron and steel member of General MacArthur's economic and scientific advisory group in Tokio, the CPA has announced.

Mr. Otis served with the CPA and its predecessor organization, WPB, for the past four years. He came to government service after 14 years of production experience with the Carnegie-Illinois Steel Corp.'s Gary works.

The particular section of General MacArthur's economic and scientific advisory group to which Mr. Otis has been assigned is headed by Richard May, former managing director of General Motors Corp. plants in Japan for six years prior to the war. Mr. May also served with the WPB for approximately a two-year period.

High Temperature Metal Needed to Permit New Engine Developments

Detroit

• • • **Ways and means** of making more effective use of aircraft exhaust gases, such as for anti-icing operations have been discussed before the annual meeting of the Society of Automotive Engineers here. Discussion developed that many engineering problems remain to be solved before these waste products are fully used, with developments awaiting progress in metallurgy which will provide metals highly resistant to high temperatures.

John J. Draney, of Consolidated Vultee Aircraft Corp., San Diego, Calif., told the Aircraft Session that waste exhaust gases can be used in a built-in system to de-ice aerodynamic surfaces. He added that with such a system properly designed and installed, commercial flights could be scheduled with safety during severe icing conditions, extending flying hours and reducing overall costs. Mr. Draney proposed that exhaust heat be forced by jet pump through ducts within the structure to leading edge surfaces likely to become iced, and said that even the propeller hub similarly could be given ice protection.

Improved materials must be available before substantial progress can be made in utilizing exhaust gases, it was explained by Ralph L. Haver and Harry A. Goodin, Jr., of Ryan Aeronautical Co., San Diego. Stainless steel and inconel were said to be inadequate. A new material, 19-9DL, offers some promise, but they asserted its limitations are exceeded even before it has had a chance to prove itself. Such materials, they said must withstand temperatures of 3000° F and above, which means they must have heat resistance better than double that of any material now available.

"There is only one main stumbling block," they declared, "on the path of exhaust equipment improvement. That barrier lies in the metallurgy of available materials. There is no material available which will satisfactorily withstand the high temperature

and corrosive atmospheres to which they are subjected. This is serious, first because it means higher costs of maintenance and operation, and secondly because it stands in the way of rapid increases in available thrust from power plants."

ACS Offers $210,000 In Fellowships For Chemical Engineering

• • • **Fellowships aggregating** $210,000 will be awarded by the American Chemical Society in 1946 and 1947 to aid in the training of chemists and chemical engineers, it was announced last week by Bradley Dewey, president.

Predoctoral students whose work was interrupted by the war will receive $100,000. Grants of $110,000 will be made to holders of the doctor's degree who desire to devote one or two years to research and teaching.

The predoctoral fellowships will carry an annual stipend of $1200 for single candidates and $1800 for married candidates, plus a maximum of $500 a year for tuition and laboratory charges. In the selection of recipients, great weight will be given to each applicant's sacrifices and contributions to the war effort, with special consideration for those who had begun their graduate work before they entered war service.

"The granting of these predoctoral fellowships in chemistry and chemical engineering by ACS is an immediate postwar measure," it was explained. "While successful candidates may reasonably expect continuation of support until their postgraduate work is completed, for a maximum period of three year, continued aid will be contingent upon satisfactory progress by the fellow."

These fellowships will be granted on the same scale as those of the National Research Council, and the committee reviewing applications for Council fellowships has been designated as the ACS Predoctoral Fellowship Committee. Members of the committee are: Professor T. R. Hogness of the University of Chicago, chairman; Professor J. C. Bailar, Jr., of the University of Illinois; Professor O. A. Hougan of the Uni-

versity of Wisconsin; Professor L. I. Smith of the University of Minnesota, and Professor H. H. Willard of the University of Michigan.

Application blanks may be obtained from Professor Hogness or from the ACS, 1155 16th Street, N. W., Washington 6. All applications should be sent to Professor Hogness at the University of Chicago before April 1, 1946.

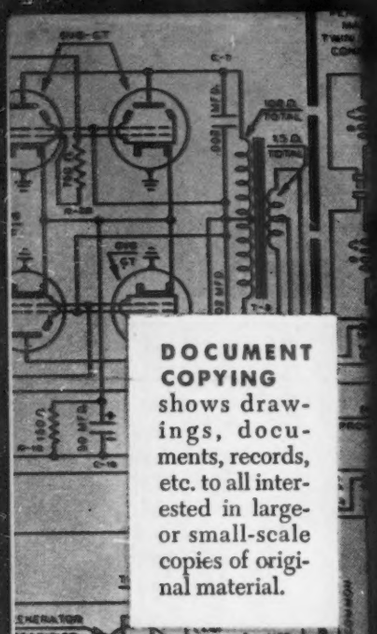
Postdoctoral fellowships will carry a stipend of $2500 a year, with the understanding that the institutions at which the recipients study will provide an additional sum, presumably at least $1000 a year, for teaching. Awards will be for one year, and will be renewable for a second year upon proof of satisfactory performance.

Chemists and chemical engineers who received the doctor's degree since Jan. 1, 1940 and have been engaged in war work, or persons who will have obtained the doctorate during the twelve-month period prior to November 1 of the year in which the award is made, are eligible for postdoctoral fellowships. All standard branches of chemistry and chemical engineering, including biochemistry, are covered by the grants. Some preference will be given to candidates interested in pure research.

The Society plans to award 10 of these fellowships before June 1, and 10 more between that date and March 1, 1947.

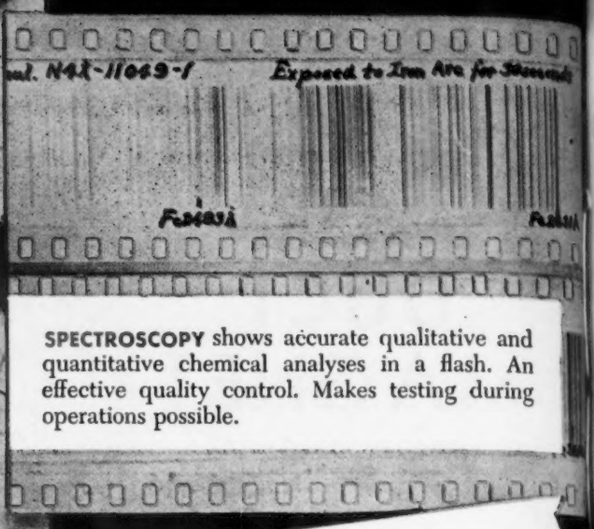
Dr. W. Albert Noyes, Jr., head of the chemistry department at the University of Rochester and president-elect of the Society, heads the committee which will administer the postdoctorate fellowships. Others on the committee are Dr. Edwin R. Gilliland of Massachusetts Institute of Technology and Dr. Ralph L. Shriner of Indiana University.

Applications for the postdoctoral fellowships, which should be sent to Dr. Noyes at the University of Rochester, must be submitted prior to April 1, 1946, by those who intend to begin work before Jan. 1, 1947, and prior to Feb. 1, 1947, by those who intend to begin work by Nov. 1, 1947. Application blanks may be obtained from Dr. Noyes or from the Society's headquarters in Washington.



DOCUMENT COPYING shows drawings, documents, records, etc. to all interested in large- or small-scale copies of original material.

STRESS ANALYSIS shows behavior of experimental parts, speeds development, assures satisfactory performance before release for production.



SPECTROSCOPY shows accurate qualitative and quantitative chemical analyses in a flash. An effective quality control. Makes testing during operations possible.

IN A CHANGING WORLD FUNCTIONAL PHOTOGRAPHY SHOWS THE WAY...

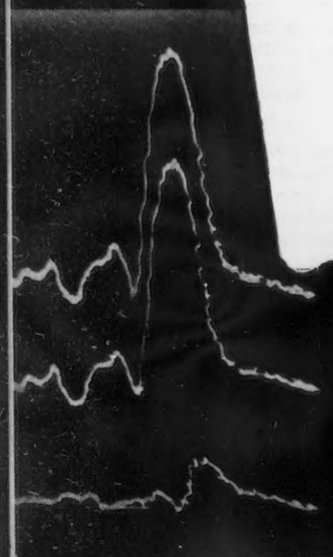
ESSENTIALLY PRACTICAL, Functional Photography more than pays its way. Reflecting the expanding needs of modern business and industry, it harnesses for those needs photography's unique powers to show . . . to record and reproduce information, much of which is beyond the ability of human vision.

In research and development, in production, in administration, Functional Photography is proving itself a dependable medium with many and varied uses . . . showing new ways to faster processes, sounder technics, lower costs, and more efficient administration in today's highly competitive world.

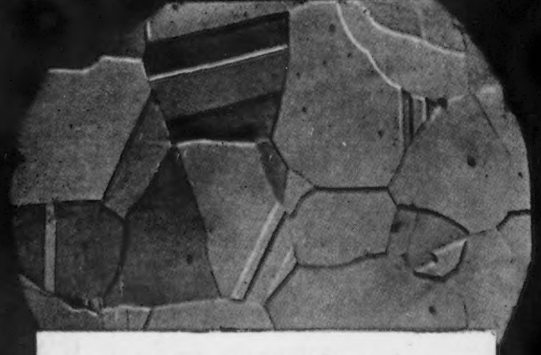
Highlighted here are a dozen examples of Functional Photography which provide a brief introduction to the wide variety of photography's uses in business and industry. Investigate their possibilities in your operations.

Eastman Kodak Company, Rochester 4, N. Y.

You will be welcome at the Kodak Exhibit. If you are planning to attend the 27th Metal Congress Exposition in Cleveland, be sure to see the Kodak Functional Photography exhibit, booths B409 and B415. It will help you determine photography's usefulness in your business. If you are not attending, write for new twenty-page "Functional Photography" booklet.



INSTRUMENT RECORDING shows electrical or mechanical phenomena too rapid for the eye to follow. Provides a record for reference.



PHOTOMICROGRAPHY shows changes in grain structure caused in material by metal-working, heat-treating, etc. at magnifications up to 5,000 diameters.

PHOTO-VISUALS show workers how to perform production operations graphically, quickly, and inexpensively.